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SUPPURATION OF THE MAXILLARY ANTRUM; WITH SPECIAL REFERENCE TO DIAGNOSIS AND TREATMENT.*

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Mr. President and Gentlemen:—It would be difficult for me to adequately express my keen appreciation of the honor your council conferred on me when they asked me to address you this evening upon the subject of Antral Suppuration. It is so easy to accept the compliment; so difficult to make the occasion worthy of the confidence you have reposed in me. My task is rendered none the easier when I find that others of high repute have covered somewhat similar ground before me, and with a thoroughness which suggests that their ideal must have been, once and for all, to say the last word upon the subject. But, fortunately for my purpose to-night, the various methods of diagnosis and modes of treatment, which may have seemed all-sufficient a few years ago, are in one respect like ourselves, in that "they have their day, and cease to be," but only to give place to others, which owe their greater perfection not only to increased clinical experience, but also to our being able to make use of those advances in scientific knowledge which characterize the age in which we live.

Another consideration which makes my position to-night a difficult one is the fact that the dental and nasal surgeon do not meet on what is quite common ground, or rather, the type of cases

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which consult the one differ in their general symptoms from those which come under the notice of the other. In fact, the antral cavity has been a kind of buffer territory separating the domain of the dental surgeon, on the one hand, from that of the nasal surgeon on the other, although I am inclined to think the latter has lately been pegging out claims with considerable energy in the neutral zone.

On such an occasion as this, and with limited time at my disposal, it would serve no useful purpose were I to review the history or methods of treatment of chronic antral suppuration which have been described from time to time by surgeons at home and abroad. For nearly ten years I have enjoyed those priceless advantages which the large cliniques of a special hospital afford for the study of diseases of the upper respiratory tract, and as the subject of purulent nasal discharges is one which has particularly interested me, it seems more fitting that I should bring before you some of the results of my own experience, but on this occasion only in so far as they refer to antral suppuration. Furthermore, and in order to provide some sort of basis for my remarks and any conclusions which may be drawn from them, I shall deal mainly with cases which have occurred in my private practice, only including with these certain others which were admitted for treatment into the Golden Square Ear and Throat Hospital, and concerning which my notes are fairly complete. My reason for doing this is that one is able to follow up the history of private patients, whereas it is practically impossible to keep in touch with the out-patients of a hospital—relief with them is often tantamount to cure, and the exigencies of work and loss of time involved in visits to the hospital lead them to cease attending before one can ascertain the final result of treatment.

Moreover, and since the material will suffice for my purpose, I shall yet further limit my cases and only make use of those which have come under my notice during the past two years, or, to be more accurate, since January 1, 1902. During this period it has been my privilege to meet with 64 cases of antral suppuration in private practice, and 18 have been admitted under my care in the hospital, making a total of 82 cases. Of the 64 patients occurring in private practice, 27 were treated by alveolar puncture, 3 were acute cases, 20 were only seen in consultation, and either refused treatment or the latter was carried out by the patients' own medical attendant, 19 were submitted to radical operation.

If these figures be added up, you will notice the total comes to 69; that is, because of the 27 patients treated by the alveolar method without complete success, 5 elected to have the radical operation performed, and hence they have been counted twice over.

The 18 cases admitted into the hospital were each of them operated on by the radical method. In 19 of the 82 patients the frontal and ethmoidal cells were also in a state of chronic suppuration, and these sinuses were radically dealt with, either simultaneously with the antrum or at a former or subsequent operation.

In 4 patients the sphenoidal sinuses as well as the afore-mentioned accessory nasal cavities were also discharging pus.

Of the 64 cases, the antral suppuration was bilateral in 12. For further details respecting many of the patients, I would refer you to the "Synopsis of Cases" which will be found accompanying this paper.

Anatomy and Development.—Before passing on to the causes of antral suppuration, let me bring one or two anatomical and developmental considerations to your notice, for they will assist us in understanding many features in the symptoms, pathology and treatment of the disease.

Although the antrum exists at birth, yet it is so small that, as Logan Turner says, "it is merely a slit-like indentation upon the outer wall of the nasal chamber, and the floor of the orbit and sockets of the teeth are quite close to one another." With the growth of the face the antral cavity increases in size by absorption of the cancellous tissue in the body of the bone, until, by the twenty-fifth year, when growth ceases, we have the adult antrum hollowing out the upper maxillary bone.

Well-marked depressions and recesses are nearly always found upon the internal walls of the antrum, and in these it is very easy for the membrane to escape the curette of the surgeon.

It is almost unnecessary to remind you of the close proximity of the roots of the second bicuspid and the molar teeth to the floor of the antrum, while in exceptional cases even the first bicuspid and canine may approach the lumen of the sinus.

The floor of the nose and antrum are upon the same level, a fact which is of practical importance in any operation in which it is desired to secure free drainage from the antrum into the nose.

The natural opening of the antrum into the nose is situated in the membranous upper portion of the inner antral wall. Seen from within the nasal cavity, it will be noticed that it opens into the channel of the infundibulum in the middle meatus of the nose. The high situation of the opening renders it very unsatisfactory for purposes of drainage. (Diagrams were shown illustrating these points.)

I would ask you to particularly bear in mind two anatomical features which have an important bearing upon the pathology and treat-

ment of nasal accessory sinus suppuration. The first is the relation of the maxillary antrum to the frontal sinus. It will be noticed that the infundibulum terminates at or in the antral opening, and that a fold of mucous membrane extends upwards from the foramen forming a pocket, at the bottom of which is the antral foramen, the fold referred to being on the inner side.

It results from this that a discharge issuing from the frontal sinus would tend to fill the antrum before the latter began to overflow into the nose, and hence the lower sinus may act as a reservoir for discharges from the ethmoidal cells or frontal sinus, without being itself primarily diseased.

Again, Tillaux has shown that if water be injected into the frontal sinus a considerable quantity of it flows into the cavity of the antrum. Hence, the fact that an antrum contains pus does not necessarily mean that it is produced there, for it may be merely acting as a reservoir rather than as a generator of the discharge. The following case will illustrate my meaning:

Mr. F., aged 54, had for five years suffered from a purulent nasal discharge, associated with nasal obstruction due to large polypi within the nasal cavities. On several occasions the polypi were removed, but the discharge continued as freely as before, and it was ascertained that it proceeded from the frontal, ethmoidal, sphenoidal and antral sinuses. Both maxillary antra were drained by the alveolar method, and for two years were irrigated twice daily with antiseptic lotions. The purulent discharge, although lessened in amount and robbed of its fœtor, continued to flow, and the patient used on an average fifty handkerchiefs a week. He finally decided to submit to radical operations upon the different sinuses, with a view to the discharge being entirely cured.

Last June I operated upon both frontal sinuses, and to my astonishment found that it was not necessary to further treat the antra, for from the day on which the operation on the higher sinuses was performed not a single drop of pus could be washed from the antra. Surely it is a remarkable thing that these sinuses (antra) could have merely acted as reservoirs of pus for so long a time without themselves becoming actual generators of the same.

The last anatomical feature to which I would like to draw your attention is that sometimes, as is shown in the diagram, some of the lower anterior ethmoidal cells spread outwards in the bony floor of the orbit, and infection may spread from these into the antrum. It is of the utmost importance in the radical operation for the cure of chronic suppuration to see that these cells (if they exist) are not

overlooked; for if left behind in a septic condition they would reinfect the antral cavity.

Causes of Antral Suppuration.—As many of you are aware, it used to be thought that all cases of antral suppuration were caused by diseased teeth, but during recent years it has become an equally well-established fact that many cases arise by infection from the nose, and this is especially likely to occur during the course of one of the acute specific fevers. Influenza has proved a prolific parent of suppuration within the nasal accessory sinuses, while in a smaller number of cases erysipelas, scarlet fever, measles, diphtheria, typhoid and pneumonia have been definitely proved to be the cause of the infection. A certain amount of catarrh of the nasal mucosa is frequently present during the course of these diseases, and since the nasal mucous membrane is continuous with that lining the accessory cavities, the latter are very prone to become affected by simple extension of the catarrhal process. Hence we can easily understand that an acute nasal catarrh may be followed by a similar condition, with retention of the secretions in the accessory sinuses, a condition possibly accounting for some of the frontal discomfort experienced during an acute "cold in the head." If owing to inefficient drainage such secretions be retained under tension, an increase of inflammation may result, and should certain micro-organisms gain access to the suitable medium thus provided, suppuration may occur—it may be in the antrum, in a single ethmoidal cell, in a frontal sinus, or in any combination of these cavities.

If we suppose an ethmoidal cell to be affected, and to have become the focus of suppuration, it is at least possible that the contained pus may find its way into the maxillary antrum, or even into a frontal sinus, and *vice versa*. So that—given an acute or chronic catarrhal condition of the mucous membrane acting as a predisposing cause—the exciting cause of empyema may be organisms associated with influenza, syphilitic nasal lesions, insanitary surroundings, or convalescence from long illnesses, especially acute infectious diseases; while, as will hereafter be stated, most cases of antral suppuration are due to septic infection starting from the root of a diseased tooth, especially the second bicuspid or one of the molar teeth.

Traumatisms will account for a certain number of cases—possibly more than we are inclined to admit—and I fear that the dental as well as the nasal surgeon is not always free from blame. For example, I have a vivid recollection of three or four cases where symptoms of empyema have immediately followed the attempt at extraction of a tooth, in which the history would seem to suggest that a portion of

a dental root was broken into the antrum. Or again, the symptoms appeared shortly after a tooth had been "filled," and were preceded by intense toothache, followed by a sudden relief which was associated with a foul smell within and a purulent discharge from the nose. Under such circumstances it is probable that the cavity within the tooth had not been rendered perfectly aseptic before the "filling" had been inserted, and the resulting suppuration had followed the path of least resistance and found its way into the overlying sinus.

On the other hand, I have known antral suppuration to follow upon the careless use of the galvano-cautery in the middle meatal region of the nose; and in two other instances it complicated the convalescence of an operation undertaken for the removal of an outgrowth from the nasal septum. Under the latter circumstances, when the nasal mucosa is in an irritable condition, and septic accumulations lie within the nasal cavities, it is particularly easy for a patient in blowing the nose to force such material into the neighboring sinuses and thus to start a chronic suppurative condition.

The question, however, which I feel sure many of you will ask me will be, what proportion of cases of chronic antral suppuration do you consider arises from dental causes?

I am afraid it is impossible for me to give you anything like a direct answer, but this statement may interest you, namely, that with one exception, in each of the sixty-four cases upon which this paper is based, diseased bicuspid or molar teeth were present (or by their absence implied previous removal for disease) upon the side corresponding to the antral suppuration. I would even go further, and say that during the past ten years, during which I must have seen at least three hundred cases of "antral abscess," I have only met with one patient (a girl, aged 12) in whom the teeth were quite healthy.

These are somewhat startling facts, but I am able to substantiate them, even though there rings in my ear the statement of Grünwald of Münich, that, out of 98 cases of antral suppuration, in 14 only could he trace with certainty their origin from diseased teeth. How does this curious difference in large experiences arise? Possibly in this way. You will notice that in my statement it is asserted that "diseased" teeth were present in all cases, and by "disease" is meant any departure from the normal, ranging from a tinny carious cavity in the crown of a tooth to a septic condition involving the crown, roots and surrounding alveolar sockets. In a few of my cases it was difficult to believe that the antral suppuration had been influenced in any way by a small carious cavity in the crown of what (with this exception) was a sound tooth, and it is probably all such mild cases

of dental disease which Grünwald excluded from his statistics. Nevertheless, the constancy of the association between the diseased teeth and the sinus suppuration would seem to me to be more than mere coincidence.

Or can we explain the facts in this way? That in this country there are very few people beyond the age of puberty whose teeth are absolutely sound, and therefore the chances of any one individual who is suffering from chronic antral suppuration (relatively a much rarer condition) having unhealthy teeth on the same side are very great.

Or again, may we not reasonably suppose that a small amount of disease, limited even to the crown of a tooth, will probably set up a certain degree of irritability of the mucous membrane of the antrum in the neighborhood of the root of that tooth—shall we say an increased vulnerability, which renders it more liable to infection from the nose? Unless it be assumed that my figures are the result of mere coincidence, I fear we must adopt some such explanation as this, and in this connection would quote what Grünwald says, in spite of his opposition to the frequency of dental disease as a cause of antral suppuration. He says: "I would especially emphasize the fact that a tooth must not be considered harmless because the socket is not diseased. Infection creeps along the lymphatics of healthy bone, and a focus of infection in the crown of a tooth is by no means to be despised, for even if an empyema of the antrum be due to another cause, yet disease of the crown of a tooth is calculated to maintain such a state of irritation in the mucous membrane as may frustrate all attempts at cure."

Symptoms.—The symptoms of acute antral suppuration are so well known to you that I need scarcely do more than mention the acute throbbing pain in the cheek and supraorbital region, tenderness of one or more teeth and their immediate neighborhood, especially that of the canine fossa. Sometimes the soft tissues of the face and cheek are also swollen and tender, while fever and the constitutional symptoms associated with it add to the sufferings of the patient. Relief comes when the abscess bursts into the nose, or is relieved by extraction of the inflamed tooth and (if necessary) perforation through the alveolar socket.

A patient suffering from chronic antral suppuration will, I take it, consult the dental surgeon only when dental symptoms are prominent, but the medical attendant is often appealed to for the relief of symptoms which do not at first sight suggest the antrum, *e.g.*, "an offensive discharge from the nose," a frequently recurring "dis-

agreeable taste," "increasing difficulty in breathing through the nose," due to the formation of polypi, "chronic nasal catarrh," "headache," "brow ague," feelings of "weight over the forehead," or "round the eyes." In other cases the digestion is impaired owing to more or less severe forms of gastritis, brought about by the swallowing of pus into the stomach; while absorption of the purulent material into the general circulation has a very subtle effect on the nervous system, inducing a lack of energy and general condition of depression, which may perhaps be best exemplified by the following passage taken from a patient's letter two months after the antra had been drained. She says, "Before the operation I was always depressed, and often cried several times a day; if I walked a mile I was tired out, but now I can walk eight miles without any fatigue whatever," etc., etc.

If the dental symptoms be associated with a "discharge of offensive matter from the nose," coupled with a "sickly taste" in the mouth, and at the same time there are frequent attacks of supra-orbital headache—possibly of greater severity during the earlier hours of the day—especially if these symptoms should be associated with any of those I have already mentioned, under such circumstances you may reasonably entertain a strong suspicion that the antrum is diseased, either alone or in combination with the other accessory sinuses.

Diagnosis.—Here, again, we must not dwell upon fine details, because, in order to recognize the chief diagnostic features of chronic antral suppuration as seen within the nose, I should have to presume that you had an intimate acquaintance with the appearances of the nasal cavities both in health and disease. Still less is it necessary for me to discuss the diagnosis of those difficult cases in which more than one of the accessory cavities are simultaneously affected. Two tests, however, which you may often apply with advantage are the following:

(1) Ask the patient to blow his nose thoroughly upon the affected side until no pus is expelled. Then let him rest for from three to five minutes with the suspected antrum uppermost, during which time the pus will probably flow into the nose. On again blowing the nostril the yellow, and often offensive discharge may once more be seen upon the handkerchief.

(2) Let the patient place the feet close together and endeavor to touch his toes without bending the knees. If this position be maintained for from one to two minutes, considerable congestion of the head will be caused, and aching of the inflamed tooth or diseased antrum, or corresponding frontal region, may be induced.

As I stated just now, the appearance of pus in the middle meatus of the nose (diagram), the presence of polypoid granulations or hypertrophies in this position, or the well-known swelling of the mucosa covering the uncinate process of the ethmoid ("Kaufmann's cushion"), cannot be discussed with any advantage upon this occasion.

Presuming we are dealing with an uncomplicated case of unilateral suppuration, there is one test which whilst not by any means infallible, may give you strong confirmation of your suspicions of antral mischief, while it is painless and usually of considerable interest to the patient. I refer to transillumination by means of a small 6 to 10-volt electric lamp placed within the patient's mouth, while the room is darkened or the head covered with a dark cloth, in order to obtain the fullest contrast between the lights and shades provided by the test.

If there be pus within the antrum it will be noticed that there is no infraorbital "light crescent" upon the diseased side, or a much less definite one than on the healthy side. This infraorbital opacity is due, in my opinion, to a chronic inflammatory process in the bony walls of the antrum, because not only it is present immediately after the pus has been washed out, but may sometimes be seen forty-eight hours after the radical operation has been performed, and when the sinus cavity is without any membranous lining at all. Unfortunately the test is not always reliable because a similar opacity may be noted in healthy but thick-walled antra, and of course its value is diminished when both sinuses are diseased. Other conditions may also modify its reality, but in the great majority of cases it may very materially assist you in *confirming suspicions* founded upon other symptoms presented by the case.

(A practical illustration of transillumination in a patient suffering from chronic antral suppuration was given.)

There is only one absolutely certain means by which you can demonstrate the presence or absence of pus in the antrum, and that is by exploration of the cavity. Formerly it was (and I fear, in many quarters still is) the custom to perforate the alveolus under nitrous oxide anæsthesia and if necessary to remove a tooth for the purpose. Should the exploration demonstrate the absence of pus, the patient will possibly have lost a useful tooth, to say nothing of the inconvenience of the anæsthetic, and of—not improbably—a considerable amount of after-pain and discomfort in the jaw.

All these disadvantages can be obviated by making a puncture within the nose. This little operation is practically painless. It needs no general anæsthetic, it may be done in the consulting room, and its evidence is absolutely reliable.

A small dossil of wool is moistened with a 10 per cent solution of cocaine and applied by means of a probe to the inner wall of the antrum underneath the anterior end of the inferior turbinal bone. In a few moments a (Lichtwitz's) fine trochar and cannula are passed outwards, backwards, and slightly upwards, through the inner antral wall. The trochar is withdrawn, leaving the cannula in position, and to its proximal end is fitted a rubber tube through which some warm boracic or normal saline solution can be injected. If there be any pus in the sinus it is at once demonstrated by this simple, bloodless, and absolutely reliable method. Curiously enough, in a number of cases in which I have used it, immediately the antrum had been perforated the patient at once complained of aching in one of the diseased teeth upon the same side. This was very valuable information, for it at once suggested which one, of perhaps several unsound teeth, was the real cause of the trouble.

Treatment.—The treatment of acute antral suppuration need not detain us long. The painful symptoms rapidly subside if free drainage be provided, either through a tooth socket in the alveolus, or through a large opening in the inferior meatus of the nose. If the antrum be irrigated daily with some mild antiseptic for ten days to a fortnight, the suppuration will cease and the opening in the alveolus may be allowed to close. Very occasionally one irrigation will suffice and the insertion of a drainage tube will be unnecessary. It is a moot question whether any tube is necessary in acute cases or whether they will not do better if only a moderate-sized alveolar perforation be made. Personally, I prefer a tube because we can be sure of efficient drainage until it is certain that suppuration has ceased, whereas, should the opening close before the discharge has quite disappeared, it might be necessary to open up the alveolar perforation for a second time.

With regard to chronic suppuration, you will gather from what has already been stated that in the treatment of every case the first desideratum is that the teeth be attended to, and this even when the history may seem to indicate that the primary infection entered by way of the nose. However clear such a sequence may be, a diseased tooth may add such irritative factors as to rob any other methods of treatment of complete success, and hence the reason why your services should be requisitioned.

Next will come the question, what form of local treatment shall be adopted for checking the suppuration within the antrum? Will you pardon me if I presume to remind you that we are dealing with a bony-walled cavity which is lined by a pyogenic membrane and that

our first endeavor should be to restore the latter to its natural condition, or failing this, we must adopt other means to cure the patient's symptoms. In any case we must be guided by those well-known principles of surgery which are adopted in other regions of the body in the treatment of abscess cavities. I would not emphasize this point had my experience not amply proved to me that such principles are often more honored in the breach than in the observance. Now there are three principles which should influence us in the treatment of all our cases:

(1) *Efficient Drainage,* the ultimate success of which will be accelerated by frequent irrigations of the unhealthy mucous membrane with mild antiseptic washes.

(2) *More or less Obliteration of the Diseased Cavity.* This last method will be the final one if failure attends a fair or lengthy trial of simpler measures.

(3) *Attention to the general health of the patient.* We must never forget that defective hygienic surroundings and excesses in eating, drinking and smoking have a very great influence for evil upon the general progress of the case. Immoderate use of alcohol or tobacco have a great tendency to induce congestion and chronic catarrhal conditions of the mucosa of the upper air passages, conditions which are very adverse to rapid recovery after operative interference in these regions. Occasionally two or three grains of calomel over night, followed in the morning by a saline draught, will produce more improvement than all those new antiseptics of "high destructive power," the advertisements of which form an increasing constituent of our waste-paper baskets.

(1) *Drainage* (Alveolar Method). Since efficient drainage can only take place when our opening is situated at the lowest level of the abscess cavity, it need scarcely be said that an alveolar perforation is better than drainage through the canine fossa, or through the inferior meatus of the nose. Drainage through the canine fossa is inefficient, and the tube or plug often causes great irritation of the mucous membrane of the cheek or gums, while any but a large opening in the inferior nasal meatus has a very great tendency to close, in addition to which the patient nearly always finds a difficulty in carrying out the necessary irrigations.

You all know the many and ingenious alveolar drainage tubes which from time to time have been invented. Those seem to answer best in which a plate fixed to adjacent teeth supports a metal tube, the lumen of which is about the size of a crow-quill, and which is occupied by a split plug which can be inserted during meal-times in

order to prevent access of food to the antrum. I have also seen cases do equally well in which a solid plug takes the place of the tube. Whichever form of tube you adopt, be careful that its upper end, when it is in position, does not stand high above the level of the antral floor, under which circumstances its very function as a drain will be destroyed.

As to the irrigating lotion which the patient shall use, I can only say that I am wedded to no one in particular, and am certain that the best results will be attained by constantly changing the nature of the antiseptic. A saturated solution of boracic acid, chlorate of potash (grs. xx. to the ℥i), carbolic lotion (1 in 60, for the early treatment of offensive cases), lysoform, the active principle of which is formalin, in strength min. v. to a tumberful of water, peroxide of hydrogen, 10 per cent solution, sulphate of zinc (grs. ii. to ℥i.), and finally normal saline solutions—all these may be found useful. In the later stages, after washing out the antrum, it may be well to inject and leave within the cavity ℥ss. of an alcoholic solution of boracic acid (pulv. ac., boracic, grs. x., spir. vini rect., aq. destill. aa ℥ii.).

At the outset the patient should wash out the antrum twice daily. As the discharge lessens, once daily, with further improvement, every second or third day; and finally, if after an interval of ten days no pus returns upon irrigating, then the case may be considered cured and the tube removed.

Remember: (*a*) Always use the solution warm, (*b*) never use warm water alone, even when sterilized. Its density is different from that of blood serum, and will often induce a free discharge of mucus, and sometimes cause pain.

Three questions now suggest themselves:

(1) What is the result of such treatment?

(2) How long should it be continued?

(3) To what class of case should it be applied?

(1) With regard to the result, my experience is that in nearly all cases—even those of long duration—alveolar irrigation rapidly diminishes the amount and fœtor of the pus, together with those more general symptoms which have been described; but that in cases of more than a few months' duration, it is extremely difficult to get rid of the last trace of discharge, so that you can feel justified in removing the tube altogether. I have recently ascertained that out of 27 of my patients in whom the alveolar treatment was adopted and irrigation patiently persevered in, only 5 have been able to give up their tubes. The rest still find a small amount of purulent secretion

comes away on irrigation and if they fail to carry on the treatment an increase in the amount of discharge is rapidly noticed.

(2) How long should the treatment be continued? Until the discharge entirely ceases, or until the failure of simple measures renders it obvious, that if the patient desires an absolute cure some further and more radical treatment will be necessary. Out of my 27 alveolar cases seen during the past two years, 15 of them have worn the tube and carefully irrigated for at least six months. One patient had been doing so for ten years, another three and a half, and a third for two years. Many of them found the tube caused no inconvenience and preferred to go on with the irrigation. Five, however, elected to have the radical operation, and I am glad to say that they have without exception been cured, and by the term "cure" I mean that not a trace of pus can be found within the nose.

(3) To what class of case should the alveolar treatment be applied? Certainly to all those the duration of which has been a matter of months rather than of years, and possibly as a first measure in most of the chronic cases, because now and again, even in these, alveolar drainage and irrigation have resulted in a rapid cure.

The advantages of the method are its simplicity, and in this respect it is scarcely a more serious operation than the removal of a tooth. The after-treatment can soon be carried out for long periods by the patient himself and the general improvement which is effected is very great, even if the measure be not an entirely curative one. To the very old, the broken in health, the nervous, the busy man with the cares of a family and an exacting occupation and to whom a week or ten days' lying up is a very serious matter, the alveolar method has many advantages. On the other hand, we meet with cases of long-standing suppuration, in which—no matter how persistently or with what variety the irrigating lotions are used—still the discharge of pus from the nose into the mouth is profuse, the patient becomes tired of irrigating, and wants to know "if something can't be done to cure him once and for all?" Or, perhaps, he or she will be one of those impatient individuals who "do not want to be bothered with tubes," but fret day by day because they "can blow matter from the nose, and always have a nasty taste in the mouth." For this class of patients we may adopt other and more radical measures.

Apart, however, from such reasons as I have just quoted, there are yet others which may necessitate our advising more radical measures than alveolar irrigation. I refer to those cases in which, in spite of constant irrigation, the ethmoidal and the frontal sinuses

tend to become involved in the suppurating process. Under these circumstances the patient is certainly not in a safe condition, a fact of which I have only recently been reminded by the reports of two fatal cases, in which meningitis supervened upon long-standing frontal sinus suppuration.

As an illustration of the type of case I may mention the following:

Mr. G. H. consulted me some seven years ago for bilateral antral suppuration. His alveoli were drilled and plugs inserted by his dental surgeon. He carefully irrigated his antra twice daily with varying lotions for seven months, and when I examined him at the end of this time the pus had lost its fœtor and was diminished in amount. However, I noticed that polypi were beginning to form in the middle meatal regions of the nose and that the mucosa over the uncinate processes of the ethmoids was swollen. Fearing an extension of the disease, I advised a radical operation upon both antra, but this course was not adopted.

I did not see the patient for three years, when he came to me with severe frontal headache, œdema of the right upper eyelid, and general symptoms of malaise. There was little difficulty in determining the presence of suppuration in the ethmoidal cells and washing pus out of the right frontal sinus.

The inability to cure such cases by simple alveolar drainage and irrigation and their chronicity are due to the fact that the mucous membrane of the antrum has in a greater or less degree undergone a polypoid degeneration. It is no wonder then, that mere cleansing by means of a mild antiseptic lotion once or twice a day fails to cure the suppuration. Neither would such treatment be considered efficient in the case of a chronic abscess in any other part of the body. For such conditions as these we have, fortunately, a treatment which gives the most satisfactory results. I refer to the so-called radical operation, with the evolution of which the names of Caldwell, Spicer, and Luc are associated, and the essential features of which are an opening in the canine fossa, curettage of the diseased mucous membrane and a counter-opening into the nose. In the particular operation which has given me my best results I have introduced a further modification which in the more advanced cases has very materially helped in effecting a rapid cure. Briefly, the radical operation, as practiced in my cases, is carried out as follows:

(2) *The Radical Operation.*—An aseptic sponge having been passed into the naso-pharynx and a second one placed between the cheek and teeth on the affected side, in order to prevent any flow of blood into the larynx, the anterior end of the inferior turbinal bone

upon the diseased side is removed by a pair of angular scissors and a wire snare. An incision is then made in the gingivo-labial groove and over the canine fossa parallel to the alveolar process of the jaw, and extending from the malar process of the superior maxilla to the canine ridge. The soft parts and periosteum are turned up and the anterior wall of the antrum, as represented by the canine fossa, is removed by gouge and mallet. An opening is made in the canine fossa, between the size of a sixpence and a shilling, the larger within reason the better, but care should be taken not to wound the infra-orbital nerve. The diseased mucous membrane is then carefully and thoroughly curetted away, the free hemorrhage which interrupts the procedure being checked by means of a good supply of sterilized strips of gauze. The same end may be more rapidly attained if, after having curetted away most of the diseased membrane, one or two strips of gauze be moistened in adrenalin chloride, or hydrogen peroxide solution, and tightly packed into the sinus and allowed to remain for three to five minutes. The time thus lost will be more than regained by the greater ease with which subsequent proceedings can be carried out.

At this stage we have to decide how much of the inner antral wall shall be taken away in order to provide free drainage from the sinus into the nose.

The following considerations should guide you. If the diseased mucous membrane be mainly confined to the lower half of the antrum and the middle meatal region of the nose be healthy, it will suffice if a counter-opening be made in the lower anterior region of the naso-antral wall; this opening should at least be as large as a sixpence because of the great tendency to cicatrization which characterizes wounds in this neighborhood.

If, on the other hand, the whole of the lining membrane be diseased, and especially if polypi or mucous membrane hypertrophies be seen in the middle meatus of the nose, the whole of the inner antral wall should be removed, and it is this modification of the simpler operation which has yielded me my best results. The reasons for this extensive ablation are twofold: the lower half being removed for drainage purposes, the upper half in order to destroy that membranous portion of the inner wall which is often in a polypoid condition, and also to gain access to any lower ethmoidal or maxillo-ethmoidal cells which are so frequently diseased, and which, if left untouched, will reinfect the antrum. The sinus cavity is finally mopped out with strips of gauze soaked in carbolic lotion (1 in 20), and the operation is completed. It is unnecessary to insert any packing unless the

hemorrhage be unusually free; in any case only a loose strip of gauze will be necessary, which should be removed forty-eight hours after the operation and not replaced. In a straightforward case the operation may be completed in from thirty to thirty-five minutes.

The after-treatment consists in douching out the nose, and by this means also the antrum, twice daily for two or three weeks with some mild antiseptic wash. The patient can sit up on the third day after the operation, and may usually go out within ten days. The bucco-antral wound heals very quickly (seven to ten days), and no deformity or falling in of the cheek occurs. I would particularly emphasize the latter point, because one of the objections which have been raised against the radical operation is the deformity which may result. During the past two years I have performed this operation thirty-seven times, and have kept myself intimately acquainted with the progress of each patient, and it is with no small feeling of satisfaction I can record 34 successful cases as against three imperfect results (*vide* "Synopsis of Cases"). The three patients to whom I refer were not operated upon by quite the same method as I have just detailed, and therefore cannot be said to detract from the value of the operation which I am advocating. The failure to produce complete cure in the patients referred to was due, I think, to the fact that no counter-opening was made into the nose.

Excepting for a troublesome neuralgia, which occurred in four cases and lasted for from four to ten days, I have met with no complication.

To the question, "What circumstances would guide you in advising a radical operation without preliminary trial of simpler measures?" we may answer, "The appearances presented by the middle meatus of the nose." If in a long-standing case this region be filled with polypoid granulations or swollen and œdematous mucous membrane, then it is fairly certain that the antral mucous membrane is also in an advanced state of chronic degeneration, and nothing short of radical treatment will effect a permanent cure.

You may quite naturally ask, "What is the condition of the antrum in a successful case, six months after operation?"

There can be no doubt that it is partially obliterated by the granulations which spring up over the bony walls uniting with those which grow inwards from the soft tissues of the cheek through the large opening in the canine fossa. This mass of granulation tissue becomes covered with epithelium which spreads inwards from the circumference of the naso-antral opening, because without this natural method of healing suppuration would inevitably continue.

SYNOPSIS OF 35 CASES OF CHRONIC ANTRAL SUPPURATION TR

Name.	Age	Duration of Symptoms.	Number of Sinuses Involved.	Duration of Alveolar Drainage.	Date of Radical Operation.	Nature of Radical Operation.	Result.
Mr. C.	22	6 years	Both antra	Rt. 3 mons. Lt. 7 days	Jan. 11, 1902 Mar. 22, 1902	Large opening in canine fossa—curettage. " " " " and into nose.	cured
Mr. G.	28	8 years	Lt. antrum	nil	April 4, 1902	Large opening in canine fossa—curettage.	cured
Mrs. I.	52	4 years	Rt. antrum	4½ months	May 28, 1902	Large opening in canine fossa and inner antral wall.	cured
Miss C.	22	"many years"	Rt. antrum	12 months	Sept. 9, 1902 Nov. 11, 1902	Opening in canine fossa—curettage—recurrence of suppuration necessitating second operation.	imperfect result
Mrs. E.	44	8-10 years	Rt. antrum	6½ months	Sept. 23, 1902	Opening in canine fossa and naso-antral wall.	cured
Mr. K.	21	18 months	Lt. antrum	8 months	Oct. 10, 1902 Feb. 10, 1903	Opening in canine fossa only. Recurrence. " " " and naso-antral wall.	cured
Mr. M.	31	4 years	Rt. antrum	3 years	Oct. 21, 1902	Opening in canine fossa only. Patient had already a large alveolar opening.	cured
Miss J.	31	12 months	Rt. and Lt. frontal sinus Lt. antrum	nil	Nov. 11, 1902	Opening in canine fossa—curettage—followed by drainage and irrigation through opening.	cured
Mr. M.	22	5 years	Rt. and Lt. antra	11 months	Nov. 25, 1902	Opening in canine fossa only.	imperfect result
Mrs. H.	71	2 years	Rt. frontal sinus Rt. antrum.	nil	Nov. 25, 1902	Radical operation (Kundt's) on frontal sinus. " " " right antrum.	cured
Miss H.	40	8-9 years	Rt. } Frontal } Ethmoidal Lt. } Sphenoidal Rt. and Lt. antra	3 months	Jan. 9, 1903	Both frontal, ethmoidal, and sphenoidal sinuses were treated by the radical method at one operation. A fortnight later both antra were curetted through a large opening in the canine fossa.	cured
Miss H.	19	3 years	Rt. frontal sinus Rt. antrum.	nil	Jan. 12, 1903	Opening in canine fossa and removal of whole inner antral wall.	cured
Mr. H.	25	3 years	Rt. and Lt. frontal sinus Both antra	nil	Jan. 13, 1903 Jan. 27, 1903	" " "	imperfect result
Miss C.	22	6 years	Rt. antrum	8 months	Feb. 3, 1903	" " "	cured
Miss P.	26	4 years	Rt. antrum	4 months	Feb. 5, 1903	" " "	cured
Dr. M.	30	5 years	Rt. antrum	12 months	Feb. 20, 1903	" " "	cured
Mrs. B.	36	8 years	Lt. antrum	nil	Mar. 14, 1903	" " "	cured
Miss G.	12	3 years	Rt. and Lt. frontal sinus Rt. and Lt. antra	nil	Mar. 3, 1903 Mar. 17, 1903	Frontal sinuses operated on by radical method. Opening in canine fossa and removal of whole inner antral wall.	cured
Miss G.	25	6 months	Rt. antrum	nil	Mar. 17, 1903	Radical operation.	cured
Mrs. J.	70	4 years	Lt. antrum	nil	Mar. 21, 1903	" "	cured
Mr. F.	36	—	Rt. and Lt. frontal sinus Both antra	nil	Mar. 26, 1903	" "	cured
Mrs. B.	33	2-3 years	Lt. frontal sinus Lt. antrum	nil	Mar. 27, 1903	" "	cured
Mr. D.	27	14 years	Lt. antrum	4 weeks (no relief)	Mar. 28, 1903	" "	cured
Mrs. I.	24	9 months	Rt. antrum Lt. antrum	5 months	Mar. 31, 1903	" "	result unknown
Mr. B.	29	4 years	Both frontal sinus Both antra	nil	April 4, 1903	" " (Left sinuses only operated upon.)	cured
Col. S.	44	25 years	Both frontal sinus Both antra	nil	April 16, 1903 May 4, 1903	Radical operation.	cured
Miss S.	29	10 years	Rt. antrum	nil	June 8, 1903	" "	cured
Miss E.	20	2 years	Bilateral frontal sinus Bilateral antra	nil	Jan. 5 June 9	" "	cured
Miss O.	47	5 years	Rt. frontal sinus Rt. antrum	nil	June 26, 1903 June 9, 1903	" "	cured
Mrs. M.	38	3-5 years	Rt. antrum	nil	June 17, 1903	" "	cured
Miss S.	35	2 years	Lt. antrum	nil	July 28, 1903	" "	cured
Miss S.	34	9 months	Lt. antrum	5 months	Sept. 15, 1903	" "	cured
Mr. B.	60	10 years	Lt. frontal sinus Lt. sphenoidal sinus Lt. antrum	18 months	Sept. 19, 1903	" "	cured
Miss V.	29	5 years	Both antra	nil	Oct. 6, 1903	" "	doing well
Lady S.	—	—	Lt. antrum	nil	Oct. 15, 1903	" "	doing well

Date of Radical Operation.	Nature of Radical Operation.	Result.
an. 11, 1902	Large opening in canine fossa—curettage.	cured
ar. 22, 1902	,, ,, ,, ,, and into nose.	
pril 4, 1902	Large opening in canine fossa—curettage.	cured
ay 28, 1902	Large opening in canine fossa and inner antral wall.	cured
ept. 9, 1902	Opening in canine fossa—curettage—recurrence of	imperfect
ov. 11, 1902	suppuration necessitating second operation.	result
pt. 23, 1902	Opening in canine fossa and naso-antral wall.	cured
ct. 10, 1902	Opening in canine fossa only. Recurrence.	cured
eb. 10, 1903	,, ,, ,, and naso-antral wall.	
ct. 21, 1902	Opening in canine fossa only. Patient had already a large alveolar opening.	cured
ov. 11, 1902	Opening in canine fossa—curettage—followed by drainage and irrigation through opening.	cured
ov. 25, 1902	Opening in canine fossa only.	imperfect result
ov. 25, 1902	Radical operation (Kundt's) on frontal sinus.	cured
	,, ,, ,, right antrum.	
an. 9, 1903	Both frontal, ethmoidal, and sphenoidal sinuses were treated by the radical method at one operation. A fortnight later both antra were curetted through a large opening in the canine fossa.	cured
an. 12, 1903	Opening in canine fossa and removal of whole inner antral wall.	cured
an. 13, 1903	,, ,, ,,	imperfect
an. 27, 1903		result
eb. 3, 1903	,, ,, ,,	cured
eb. 5, 1903	,, ,, ,,	cured
eb. 20, 1903	,, ,, ,,	cured
ar. 14, 1903	,, ,, ,,	cured
ar. 3, 1903	Frontal sinuses operated on by radical method.	cured
ar. 17, 1903	Opening in canine fossa and removal of whole inner antral wall.	
ar. 17, 1903	Radical operation.	cured
ar. 21, 1903	,, ,,	cured
ar. 26, 1903	,, ,,	cured
ar. 27, 1903	,, ,,	cured
ar. 28, 1903	,, ,,	cured
ar. 31, 1903	,, ,,	result unknown
pril 4, 1903	,, ,, (Left sinuses only operated upon.)	cured
pril 16, 1903	Radical operation.	cured
ay 4, 1905		
une 8, 1903	,, ,,	cured
Jan. 5	,, ,,	cured
June 9		
une 26, 1903	,, ,,	cured
June 9, 1903		
une 17, 1903	,, ,,	cured
uly 28, 1903	,, ,,	cured
Sept. 15, 1903	,, ,,	cured
Sept. 19, 1903	,, ,,	cured
Oct. 6, 1903	,, ,,	doing well
Oct. 15, 1903	,, ,,	doing well

ION TREATED BY RADICAL OPERATION.

	Result.	Date when last seen.	Remarks.
	cured	May, 1902	After-treatment consisted in irrigation and free drainage until antrum was filled with granulation tissue.
	cured	Sept., 1902	After-treatment consisted in irrigation and free drainage until antrum was filled with granulation tissue.
ll.	cured	July, 1902	Mucous membrane over bucco-antral wound sutured at close of operation.
of	imperfect result	July, 1903	A very small amount of muco-pus can occasionally be syringed out of the nose through the fistula leading from canine fossa to natural ostium of the antrum in the nose.
	cured	Nov., 1902	A small sequestrum was found on the floor of the antrum.
	cured	Oct. 11, 1903	Recurrence was due to a suppurating focus in the upper, inner, posterior corner (ethmoidal region) of antrum.
ly	cured	Aug. 4, 1903	Patient had an alveolar opening which would admit a lead pencil but it failed to cure the discharge in spite of constant irrigation.
oy	cured	July, 1903	Both frontal sinuses were subsequently opened and obliterated by Kundt's method.
	imperfect result	Aug. 12, 1903	Two or three months evolved before suppuration almost entirely ceased, during which time rubber plugs maintained the patency of the openings in the canine fossæ.
	cured	July, 1903	
es	cured	Oct., 1903	From time to time nasal polypi had been removed and antra drained by different surgeons. Also applications of galvano-cautery to middle meati. Radical operation at once carried out when patient came under care of writer.
n. gh			
le	cured	June, 1903	Frontal sinus obliterated by radical operation. A previous operation through canine fossa (only) had been performed, but discharge continued. Diseased mucous membrane was found in upper, inner, posterior angle of antrum.
	imperfect result	Oct., 1903	Both frontal sinuses have been obliterated by radical operation. There is a narrow, fistulous tract into the left antrum from opening in canine fossa through which a very small amount of pus discharges.
	cured	June, 1903	Operation was followed for six weeks by a tendency to formation of dry crusts within the nose.
	cured	Sept., 1903	
	cured	May, 1903	An old piece of rubber drainage tube was found in the antrum.
	cured	Aug. 13, 1903	Patient preferred the radical operation without preliminary trial of alveolar drainage.
d. er	cured	July, 1903	
	cured	April 14, 1903	
	cured	July 2, 1903	Patient elected to have radical operation in first instance. The left nasal cavity was full of polypi and antrum filled with large polypoid granulations.
	cured	Oct., 1903	
	cured	Oct., 1903	Frontal sinus was operated on by radical operation at same time as antrum.
	cured	Sept. 13, 1903	Patient suffered from intense supraorbital neuralgia which was unrelieved by alveolar drainings.
	result unknown	—	
	cured	Oct. 24, 1903 (By letter)	There is a slight discharge from right frontal sinus and right maxillary sinus is being drained.
	cured	Oct., 1903	A superficial molecular necrosis of the posterior wall of the left frontal sinus occurred; it did not penetrate the whole thickness of the bone, and gave rise to no symptoms.
	cured	Oct., 14, 1903	
	cured	Sept., 1903	The left frontal sinus has been obliterated by operation and both maxillary antra have been operated on by the radical operation.
	cured	Nov., 1903	
	cured	Aug. 6, 1903	Whole inner antral wall not removed because upper part seemed healthy.
	cured	Nov., 1903 (By letter)	
	cured	Nov., 1903	A fistulous suppurating tract led into the left maxillary antrum through the site of wisdom tooth which was removed 18 months previously.
	cured	Nov., 1903	A large opening had on this occasion been made through the alveolus and curettage carried out. Discharge continued freely. Neuralgia for 10 days after operation.
	doing well	Nov. 8, 1903	
	doing well	Nov., 1903	The first and second molars were dead and their septic roots projected through floor of antrum. Suffered from severe neuralgia for 14 days after operation.

It is only necessary to examine a patient four or five months after operation with a small mirror passed within the nose, or by means of a curved probe, to satisfy oneself that the original antral sinus is partially obliterated and is only represented by a concavity upon the outer side of the nasal fossa which is very much smaller than the original antrum.

Some of you may be aware that other operations of a radical nature have been recently advocated, and most of these aim at making a large naso-antral opening in the inferior meatal region. It is suggested that the manipulations can be performed under cocaine anæsthesia and are especially suitable for the nervous and those suffering from weak hearts. But when I read that before commencing to operate "it is a good plan to fortify the patient with an ounce of whisky, 1/25 gr. strychnia sulph. and 1/15 gr. digitaline," and later on in the same article that "orthoform or cocaine may be used to limit the pain, or if we so decide, the curetting may be postponed until another day," I am bound to say that I think such nervous and weak-hearted individuals would be far better off in those regions of kindly oblivion through which they may be so safely and ably conducted by our skilled anæsthetists, while at the same time the surgeon can do his work thoroughly, once and for all.

When we bear in mind the pathological condition present in cases of chronic antral suppuration, it will be obvious to you all how necessary it is that the surgeon should have the diseased areas in full view, in order that he may efficiently deal with them. Operations or manipulations which do not fulfill these requirements lead us to suspect that even in this year of grace "the world is still deceived with ornament" and that in our desire to be original we may lose sight of those great surgical principles which form the only sound foundation upon which truly valuable methods of treatment can be founded.

To sum up, we may say of chronic antral suppuration that, in the vast majority of cases, there is evidence to show that dental disease acts as an exciting, or at least a predisposing cause, and therefore it is to members of your branch of the profession that we must look for that prevention which is better than cure.

The diagnosis of antral suppuration may often be greatly assisted by transillumination, a method which most of you can easily adopt. It can be rendered absolutely certain by means of an intranasal puncture, which does not sacrifice a tooth, and is easily and almost painlessly performed.

Treatment will resolve itself into one of two methods:

(1) *Alveolar Drainage*, which may cure comparatively recent cases, and very occasionally a chronic one—it will give relief in all.

(2) *The Radical Operation*, which may be expected to cure all cases when the simpler method has failed.

In conclusion, Gentlemen, while thanking you for the kindly way in which you have listened to me, I regret that the exigencies of time have compelled me to treat in so cursory a manner this branch of surgery in which we are both interested. Such regret, however, is more than compensated by the feeling that—whatever may be the outcome of this meeting—it will at least be the means of introducing a friendly discussion, and, I hope, promoting the good fellowship of the members of two branches of the surgical profession who do not sufficiently often profit by an interchange of ideas. That the last word has been said upon the subject of chronic antral suppuration is more than improbable, for none of our methods can yet claim perfection, and it is only too likely that those who follow us will pity our ignorance and sympathize with our patients. Nevertheless, the surgery of the nasal accessory cavities has made brilliant progress during the past few years, and has achieved results of which we may be justly proud. The stepping stones upon the road to many of these successes have too often been anxiety, disappointment, painful experience, and even failures; but he who journeys long enough will soon verify the truth of Robert Louis Stevenson's saying: "To travel hopefully is better than to arrive, and the true success is to labor."

After the paper had been read, a practical demonstration of transillumination and intranasal exploration was given upon a patient suffering from chronic antral suppuration. Dr. Tilley also demonstrated the methods of transillumination and the puncturing and washing out of the cavity. He laid special stress upon the absolute necessity of being guided in transillumination by the infraorbital crescent of light.

DISCUSSION.

THE PRESIDENT said it was quite evident that the last word had not been said on the question, but the best word heard up to the present had been said by Dr. Tilley. It was interesting to hear of the frontal origin of the cases, which he had not known before. He asked Dr. Tilley whether the opening through which the pus went into the nasal passages was not frequently closed by inflammation and that possibly the escape of pus was not altogether a reliable sign. With regard to the contents of the bottles handed round, some of them appeared to contain teeth, and if those teeth were in the antrum they certainly must have been a source of trouble. He described a case that occurred some years ago in his own practice, where a patient

came from Scotland who had been condemned to have his upper jaw removed for an apparent growth. On examination, antral trouble was suspected, and the antrum opened, and there was removed from it some nine inches of lint in a very purulent condition, quite capable of causing any amount of irritation. That was a case where surgical zeal had been a little misplaced.

Dr. Scanes Spicer considered that Dr. Tilley's paper was an admirable presentation of the present knowledge of the subject, and he thanked the Society for inviting him to be present that night to listen to it. The great point was as to when to be content with the alveolar method and when to go in for the radical operation. At one time, 17 years ago, he was in the unhappy position at St. Mary's Hospital of having about thirty cases of empyema of the antrum, which were practically regarded as incurable cases. In those cases the mouth and nose were simply washed out. After a year or so of that he thought something more active should be tried, and he began trying the alveolar method. Not one of the cases got well by that method of puncture and drainage, but they were all chronic cases. He had also had private cases with specially skilled dental surgeons to do the mechanical work with similar results. In acute cases he imagined it was only necessary to remove the source of the disease, the tooth, which was the usual cause, and then the case got well. In chronic cases which had lasted months or years, it was very little use trying alveolar puncture and drainage, for the reason given by Dr. Tilley, namely, that the antrum was found to be full of thickened granulation tissue, which was practically a mass of solid flesh. In a case he operated on within the last three months he removed eighty-nine distinct polypi. If simple alveolar drainage had been adopted in that case it could not be expected that a 2 oz. bottle full of polypi would atrophy and disappear by simple drainage and washing out. He had very rarely known of a chronic antral empyema getting completely well after alveolar puncture and drainage only. Therefore he was still rather shy of recommending alveolar methods in chronic cases, and he thought one should operate boldly and go at once for clearing out the disease and making the antrum drain freely into the nose in the way Dr. Tilley had spoken of. There was still a difference of opinion in the rhinological department as to whether a radical method should be gone for at once. His opinion was in favor of the radical measure directly in a chronic case. He desired especially to know from dental surgeons what were the best tests of a tooth being at the root of the trouble, because that was often the chief difficulty which presented itself in dealing with cases practically. For instance, he found a patient with pus coming from both his nostrils, with polypi under both his middle turbinates, and an upper jaw apparently perfectly sound and some of its teeth showing the most beautiful conservative dentistry. In such a case he felt in a most difficult position. What was he to tell the patient? Was he to advise him to have teeth, which were not at all tender, removed? They were antral teeth, and the patient had a history of toothache therein, perhaps seven or eight years ago, before his nasal discharge commenced. Was it the thing to operate on those antra and leave the teeth alone

and so imperil the results of the radical operation, or should the patient be advised to have suspected teeth sacrificed when as far as a surgeon could prove there was nothing the matter with them? Surgeons would be extremely indebted to the dental profession if they would state the modes by which infection passed from the teeth into the antrum and how it was possible to say whether a tooth was covertly exciting trouble.

Mr. H. Baldwin thought that dentists would all agree that carious teeth which had living pulps were not probable causes of septic infection or causes of antral suppuration, but that dead teeth on that side in the maxilla, say from the canine to the second molar, or almost any teeth in the whole of that row, might be a cause of septic infection of the antrum. Sometimes it would be possible to find the erring tooth among a number of dead ones by the signs of alveolar periostitis about the roots of the teeth. The tooth might be tender to percussion and pressure and so allow one to see which tooth it was. But in many cases where there were a number of dead teeth in a row and none of them showed any signs whatever of having inflammation about the roots, he did not see there were any methods of telling which of those dead teeth were causing the infection until the radical operation was performed. Then it might be possible to find through the large window made in the outer plate of the antrum actually exposed roots of dead teeth projecting into the antrum, and the tooth to which those particular roots belonged would be indicated. He did not think anyone would say it was possible for a tooth with a living pulp, even if it was filled and crowned, to cause any septic infection of the antrum. He desired to know if Dr. Tilley had had any cases under his notice of antral suppuration occurring in edentulous people. Although he had not had many cases under his care he had had one case of chronic suppuration of the antrum in a perfectly edentulous patient who had been edentulous for many years; but that patient had a very badly deflected septum to the diseased side. Curiously enough, the daughter of that patient had the same kind of septum and a year or two ago had a history of antral inflammation and probably suppuration on that side. At the present time there seemed to be no antral suppuration, but her antrum was absolutely opaque to transillumination. The patient had been examined by a specialist and his opinion was that there was no active disease of the antrum now.

Mr. Norman Bennett, speaking of the possibility of infection through a live pulp, said that anyone who did not agree with Mr. Baldwin might agree that a live pulp covered with a thick layer of dentine could not be the medium of infection, but cases had been quoted in which tubercle bacilli found their way through live exposed pulp into the glands of the neck through lower molars. The tubercle bacilli had been found afterwards in the glands and in the pulps, showing fairly conclusively that the live pulp had been the medium. Further than that, experiments had been made on animals in which the dentine had been removed from the teeth to expose the pulp artificially and liquids had been persuaded to pass through the pulp and had been found in the glands of the neck. If that could happen, it

was at least possible, or more than possible, that septic infection might pass in some way, and that therefore an exposed live pulp must be included as a possible cause of infection. There was clinical confirmation of that in the periostitis sometimes found in conjunction with inflammation of the pulp, the pulp being still alive. With regard to the immense benefit in general health that occurred to the patient as the result of the cessation of very slight suppuration of the frontal sinuses, it was most interesting confirmation of what was found in general hospital practice, where even a small amount of suppuration in the mouth had caused a very considerable general debility, and where treatment had very much improved the patient, even when the masticating machinery was entirely insufficient.

Mr. Payne, in bearing out Mr. Norman Bennett's remarks with regard to live teeth possibly being associated with antral suppuration, reminded the members of the paper read by Mr. J. G. Turner a short time ago, on the subject of pyorrhœa alveolaris associated with suppuration of the maxillary antrum. He thought Mr. Turner satisfactorily proved that cases did arise directly in that connection, and personally he could quote one case in which the pulps were certainly alive and yet infection occurred through the alveolar dental membrane which was attacked by pyorrhœa alveolaris.

Mr. W. D. C. Prideaux: May I revert to "ancient history" and say a word about the neglected condition of the Highmore monument in Dorset? Dr. Nathaniel Highmore, of antral reputation, was the son of the Rector of Purse Caundle, a little village near Sherborne. He was buried in the chancel of his father's church in 1685, where a fine slab with suitable Latin inscription was placed to his memory, close to a pre-Reformation brass to a former rector, and other interesting brasses to members of Dorset families. This slab and the brasses were, doubtless, well cared for by his brother and executor, the Rev. Richard Highmore, and were there in 1870; now, alas! they are all gone from the church. While obtaining information for a contemplated history of Dorset Monumental Brasses, I discovered the latter loose at the Rectory, but the former, broken, is turned into the churchyard. Through the instrumentality of our Dorset Field Club, the Rector's and other brasses will be refixed before long; I believe if they found interest was taken by our profession in this celebrated anatomist (whose list of published works given in "Hutching's History of Dorset" is a long one), the like care would be taken of his memorial.

Mr. F. J. Bennett said that although cases might theoretically be possible of infection with a live pulp, he took it that the surgeons present desired to know what dental surgeons considered the common cause, and of all causes through the teeth the most common was that resulting from chronic alveolar abscess or chronic periostitis. The acute form did not appear often to cause trouble in the antrum but to find its way through to the outer alveolar border. When the periosteum had become thickened, and granular tissue was formed near the apex of the root, there was a great tendency to absorption in that direction, and by absorption the opening into the antral cavity. Though there was not a root going actually into the antral cavity,

there might be a chronic thickening round the apex which would lead to absorption, and so make an opening through which the septic matter could get into the antrum. He thought that would form 90 per cent of the cases in which teeth were cause of the mischief.

MR. W. HERN noticed that Dr. Tilley made some distinction between diseased teeth as a cause of antral empyema. He spoke of teeth acting as a predisposing cause and an exciting cause, and the discussion hitherto seemed to lend color to that statement. Personally, he would side with Mr. Baldwin that a dead tooth with a septic pulp was an exciting cause, a tooth with a live pulp he could not even consider as a predisposing cause. If such were so, dental surgeons ought to see a great many more cases of antral empyema; but he could assure Dr. Tilley that in the very large number of cases of living exposed pulps seen in hospital practice year by year he had never been able to associate antral inflammation with one of them. This view was corroborated by the behavior of living and dead teeth in other parts of the mouth. Dead teeth caused glandular enlargements and adenitis, but living, though carious ones, did not. As regards treatment of antral empyema it seemed to him that, as Dr. Spicer had said, they divided themselves into cases which were acute and cases which were chronic. The acute cases, in his opinion, should be drained most effectually by the alveolar method; but in chronic cases the more radical operation was often necessary. Dr. Tilley had mentioned that the tubes frequently put into the plates were somewhat longer than need be, but dentists had a method whereby they could perforate the sides of the tube, and so allow the tube to be a drain, although it penetrated above the floor of the antrum. It was always desirable to be perfectly sure that the floor of the antrum had been perforated by the tube, for if the floor was just missed the tube was useless as a drain.

MR. BELLAMY GARDNER, speaking from the point of view of an anæsthetist, said that the operation for chronic inflammation was by no means a slight one; in many cases it lasted for half an hour or three-quarters, and was of considerable severity on account of the hemorrhage and the great care required to prevent blood and liquids passing down towards the throat. The acute cases were very easily treated, as all drainage was carried out in the usual dental posture and liquids were carried forward towards the teeth, and no difficulty was found in administering either gas and oxygen, or gas and ether. But where it was necessary for the surgeon to use as far as possible the accessories to which he was accustomed with a patient in his chair in the consulting room—a headlight and a number of small probes and instruments—it had been found convenient to have the patient more or less in a semi-recumbent position, and to make preparations to prevent the passage of the liquid backward. The communication between the maxillary antrum and the nose rendered it very possible for liquids to pass backward and to cause coughing or occlusion of the air passages during the operation. Dr. Tilley had mentioned the plan he had used of introducing a small sponge into the naso-pharynx directly the patient was anæsthetized, and it had been found to answer most admirably.

With that precaution the patient could be kept in almost any position the surgeon required, lying down, partly propped up, allowing the head to be moved from side to side. If that was going to be done, it was far better not to give gas or gas and ether owing to the amount of hemorrhage which was usual in the first ten minutes when those anæsthetics had been used. He preferred to give a mixture of chloroform and ether to commence with, and continue afterwards with chloroform and Junker's inhaler. He had not found the maxillary antrum itself very greatly sensitive, and a light anæsthesia was quite sufficient. If at the end of the operation, or during any part of it, the septum of the nose was approached, a very much higher degree of sensitiveness was found. He asked the Society for some suggestions with regard to the running back of blood upon the sponge and the filling up of the sponge in the nasal cavity during the operation, as he desired some information as to the possibility of the attachment of a cannula and tube to some such apparatus as the saliva ejector, by which it occurred to him that the blood might be drawn away.

Mr. Canton thought it would be agreed that the majority of the cases undoubtedly were due to a diseased tooth or pulp. He did not suppose any one could answer Dr. Spicer's question as to how he was to know what was the cause of the antral trouble. All teeth and fillings and crowns might appear to Dr. Spicer perfectly sound, and a dental surgeon, after more carefully examining the teeth, together with the history, would be more likely to arrive at the cause. These cases were those in which the surgeon and dental surgeon should work together. He was assisting at such a case a little while ago and the surgeon applied adrenalin to the nostrils before he operated, and just before the patient was thoroughly under the anæsthetic, in order to prevent hemorrhage, and certainly there was no excessive hemorrhage in that particular case.

Mr. George Thomson said that in the usual way a tooth which was believed to be a dead tooth and inflamed was painful upon pressure or percussion, but when the tooth had perforated the antrum, and was the cause of antral trouble, it did not respond to the usual tests for periodontitis.

Dr. Herbert Tilley in reply said: "With reference to your question Mr. President as to whether the teeth which I handed round in a bottle (which also contained a quantity of diseased mucous membrane) were found in the antrum, I can answer at once in the negative. They were removed at the time I performed the radical operation, and were placed in the bottle with the contents of the antrum, as I thought the specimen might interest the members of the Society.

With regard to the presence of foreign bodies in the antrum, I once removed from this situation a piece of drainage tube one and a half inches long, which had kept up a chronic suppuration for four years. The patient was a medical man.

The President had referred to chronic suppuration occurring in edentulous patients, and, if I understood him rightly, suggested that such cases illustrated the absence of relationship between diseased

teeth and sinus trouble. My own version of such instances is that the teeth have been removed on account of disease, and the antral suppuration which they had previously caused persisted. Two such cases in old ladies over 70 years of age will be found in the Synopsis of Cases. One must always be very careful in accepting statements as regards the time of onset of antral symptoms because in the first instance they are often slight and pass under other names, *e.g.*, nasal catarrh, chronic cold in the head, etc.

With regard to the interesting question as to how far a live, dying and dead pulp may be responsible as factors in causing antral suppuration, I have come to learn rather than to instruct, and as the result of the discussion I gather that the majority of you incline to agree that a live tooth never acts as the exciting cause, but that only a "dead" tooth can exert this evil influence.

The question which I was anxious for your opinion concerning, was, "Can a live tooth with a small carious focus in its crown act as a predisposing cause of antral suppuration by reducing the resistance of the antral mucous membrane in the immediate neighborhood of that tooth? I understand the majority of you say No! and, that being the case, I must look for another explanation of the fact that in my 82 cases dental disease, of greater or less degree, was present in every case upon the side corresponding to the affected antrum.

Possibly, after all, the simplest explanation is that which I have already adduced in my paper, viz., that nearly everyone beyond the age of puberty has one or more carious teeth, and that in a relatively rare affection, such as chronic antral suppuration, the probability of diseased teeth coexisting with the antral mischief is very great.

Before leaving this matter, however, I would just like to point out, as tending to support Mr. Norman Bennett's remarks, that in other parts of the body it is well known that pathogenic organisms can pass through comparatively healthy tissues without affecting them, and produce very morbid and disastrous results in the neighboring lymphatic glands. I need only exemplify this by referring to tubercle bacilli, which will pass through the faucial tonsils to the neighboring cervical glands and there induce inflammation and suppuration. The mesenteric glands may be similarly affected by way of the lymphatic patches in the intestinal canal. Whether dental tissue would permit of this, I am not in a position to say.

With regard to the use of antral drainage tubes which are too long, I need scarcely say, Gentlemen, that I was far from suggesting this was a general rule. It was only because I have seen a good many in my practice, that I thought it would be worth my while to give the matter passing notice in my paper. My desire was to suggest that as a general rule the tube should not project more than one-eighth inch above the level of the antral floor.

THE PRESIDENT, having thanked Dr. Tilley and the members who had brought forward casual communications, and the speakers in the discussions, adjourned the Society to January 25.

ALARMING HEMORRHAGE FOLLOWING TONSILLOTOMY:—ITS CAUSE AND CARE.*

BY HARMON SMITH, M.D., NEW YORK.

Assistant Surgeon Manhattan Eye and Ear Hospital.

That post-operative tonsillar hemorrhage is worthy of deep consideration, is attested by the careful attention drawn to it by most text-books, and by the great number of conservative writers upon the subject.

Fatal cases appear to be few, but in all probability it is due more to the undesirability of heralding such facts, than to their non-occurrence. [1] Ricordeaux, in his thesis—1886—reports two deaths due to hemorrhage after amygdalotomy, operated upon by Broca; one in a male of twenty-five years of age—the other in a male, eight and a half years old, who had an anomalous internal carotid. Holinger of Chicago, in discussing the subject, at the fifty-third annual meeting of the Illinois State Medical Society, related a death from hemorrhage, following amputation of a tonsil, which occurred in the practice of one of his friends. Mackellar of Decatur, Ill., in the same discussion, mentioned another fatal case, operated upon by a fellow practitioner. [2] Dr. A. Barkan of San Francisco, Cal., reports the death of a male child, aged six, after removal of tonsil with a tonsillotome. This child had a strumous diathesis. Dr. J. A. Stucky, of Lexington, Ky., reports the death of a male patient, aged fifteen, whom he considered a bleeder. In this case there was continuous venous oozing, which would not yield to a cold spray of hydrogen peroxide, ergotin and morphine internally, or iron per sulphate locally. Here we have six fatalities with scanty data as to the cause, other than that the tonsils were removed and the patients died of hemorrhage. Whether they were all haemophiles, or whether all had misplaced arterial supply, we do not know.

If death can occur from tonsillotomy, it behoves those who are daily performing this operation to fortify themselves as much as possible, against such a contingency.

Even though the hemorrhages were not fatal, sufficiently undesirable is one where exsanguination takes place, impairing the general health of the patient, and inducing chronic anæmia, so persistent in

* Read before the Laryngological Section New York Academy of Medicine, December 23, 1903.

[1] Wright: *N. Y. Med. Journ.*, Aug. 30, 1890.

[2] *Occidental Med. Times*, vol. 8, No. 8.

its course as to baffle the skill of the physician to overcome it. Myles and Hall report cases of persistent anæmia lasting over one year following tonsillotomy.

Considering the thousands of amygdalotomies performed without alarming hemorrhage, it would seem that some special causes may be enumerated in the order of their importance, for occasioning them, such as:

(1) Hemorrhagic diathesis, or hemophilia.

In the great rush attending a large clinic, time enough is not allowed for questioning the patient or parents, as regards hemophilia. Even if queries were made, the indefinite answers given would not materially profit the operator. The symptoms of hemophilia, such as swolen and tender joints—hæmatoma following injuries—and continuous bleeding after cuts—are all indefinite when obtained through the illiterate parents of our clinical patient, consequently we have to take our chances when attending to this class of cases.

(2) Fibroid tonsils, where the glandular substance is largely enmeshed with fibrous tissue, which prevents the arterioles from contracting when cut.

This is the most frequent condition obtaining for the removal of tonsils, and although the danger is obvious, yet the pathological import is sufficient to warrant the operation.

(3) Age; occuring more in adults than in children. Due entirely to the increased fibrosis and greater vascular supply.

(4) Sex; more frequent in males than in females. In a report made from a search of the *Surgeon General's Library in Washington, consisting of thirty-one alarming hemorrhages, only six were in women. In the twenty-three cases from my own search, eight are women.

(5) Acute inflammation, when the tonsils are engorged with blood. Concensus of opinion discourages removal when this condition exists.

(6) Anæmia; when there is a marked deficiency in fibrin, the coagulating element of the blood. Ordinarily one would await the constitutional upbuilding of the patient before operating.

(7) Malignancy; where there is increased vascular supply. In these cases measures are generally taken to overcome the hemorrhage by ligation of the common carotid before removing the mass.

(8) Abnormalities[3] in the distribution of the blood vessels of the tonsil.

As: (1) Abnormal distribution of the ascending pharyngeal artery. (Wounded by Billroth while operating with a bistoury.)

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[3] De Santi, *Lancet*, Jan. 13, 1894.

(2) Abnormally large tonsillar artery.

(3) Abnormal internal carotid.

(4) Large vessel in the anterior pillar of the fauces. (A case of hemorrhage from this cause is mentioned by Weir.)

(5) Wound of large venous plexus, at the lower and outer border of the tonsil.

(7) Arterio-sclerosis.

These conditions are usually determined only after removal of the tonsil, as the tosillar mass conceals the hidden enemy, but when one observes several large vessels running from the pillars across to the tonsil, it is safer to cut these off by the electric cautery some time before the operation.

Exciting Causes.

(1) Traumatism, where the pharyngeal pillar is injured, or where the incision has gone deeper than the tonsillar quishion.

Traumatism can be avoided by less aggressiveness on the part of the operator, but frequently the pillar of the tonsil is attached, and all efforts to detach it are entirely unsuccessful, and the operator proceeds to cut through or snip out a piece of one fold. Here we would criticise the operator, yet we are assured by eminent authorities that the tonsillar pillar is never attached, and it is only the plica-tonsillaris or opercular fold which we see and that it does no harm to cut through this. In the enucleation of a tonsil, the instrument frequently enters deeper than we can appreciate, and cuts beyond the quishion, injuring some large arterial trunk. This is frequently caused by the anæsthetist pushing too hard externally upon the tonsil. With a Mackenzie tonsillotome, ample pressure can ordinarily be exerted by the operator, to engage all the tonsillar tissue advisable to be removed.

(2) Local anæsthesia combined with an astringent, as cocaine and adrenalin, which predisposes to a secondary hemorrhage.

This combnation is being used less and less.

Galvanic cautery—cautery amygdalotomes—electric tonsil snares, etc., have all been largely supplanted by Mathieu's and Mackenzie's tonsillotomes, or the cold snare—the reduction of hemorrhage by use of the former, being outweighed by the pain following such a large cauterized area.

Granted then, that we do have hemorrhage following tonsillotomies endangering the welfare of patient and operator, and that there are causes for such which are obtainable too late for practical prevention, what measures are to be taken to minimize these dangers and relieve the anxiety of the operator?

Suppose we have operated away from the office or clinical operating room, remote alike from trained assistance or surgical appliances, what should we do? Delavan and others assure us that if we sit the patient upright, and induce syncope, the hemorrhage will stop. This has proven so in many instances, yet there are six authenticated cases where this did not occur. Surely there was syncope though it is not mentioned, in fact very little is ever mentioned about unfavorable cases. Should syncope occur the bleeding preceding it is alarming to say the least, and to a timid operator distressing. It is likewise hard to ease the fears of the inquiring family. Ingals suggests tannin, both as a local application and as an injection into the tissue. Yet this has been ineffectual in many instances.

We all know that galvano-cautery will check small bleeding areas —not large ones. But it is inconvenient to carry a large four-celled storage battery to every operation.

The Paquelin cautery is another means of stopping it, but with a mouth full of blood and the patient wretching and swallowing and possibly not entirely from under the effects of an anæsthetic, it is somewhat difficult to keep from cauterizing the entire fauces. Torsion by means of a ligature through the tonsillar folds and twisting with an artery forceps offers another means of stopping the hemorrhage.

A piece of gauze, or a handkerchief soaked in tannic acid, and held upon the bleeding surface is suggested, but a busy practitioner could hardly give the time requisite for controlling the hemorrhage to say nothing of the exhaustion attending the procedure. Some have caught up the bleeding vessel with artery forceps and ligated it. This would be feasible in certain cases, where there was one bleeding point. The purse-string suture, around the bleeding stump sounds easy, but appears impracticable in a small throat. Gelatin, locally, subcutaneously, and per rectum, has its advocates in Carnot, Klempener, Wiedner, and Von Boltenstern.[4] The latter having used it successfully in hæmophilia, and to control hemorrhage from the lungs, stomach, kidney, nose and bladder.

The formula advocated is:—

Gelatin, 50 parts.
Calc. chloride, 10 parts.
Aqua destill, 1000 parts.

Ligation of the carotid might also stop it, but this is rather a serious sequence to such a simple operation as tonsillotomy is supposed to be, and in some cases bleeding has still continued from the other carotid, through its anastamosis.

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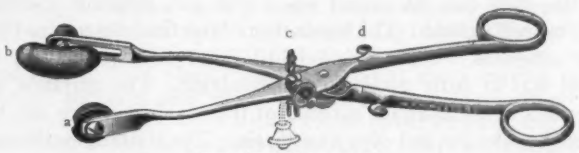
[4] *Wurzburger Abhandl.*, vol. 3, 1902-3.

French suggests veratrum viride by injection directly into the peritonsillar tissue. Head, of Chicago, also advocates this. The iron salts and other styptics, as adrenalin, alumnol, silver nitrate, acetotartrate of aluminum, tanno-gallic acid, etc., have their ardent advocates, but when the blood flows freely enough to be classed under the head of dangerous and styptics all fail, no time should be lost in applying some mechanical measure which we know will be efficient.

A most effective instrument in my hands has been the tonsillar hæmostat of Mickulicz-Stoerk. It consists of two blades so constructed, that the inner with its ovoid compressor of hard corrugated rubber fits into the cavity between the tonsillar pillars. The other blade with its cushion of chamois skin engages behind the angle of the jaw, and exerts pressure externally over the tonsillar area. The two handles are brought together by thumb and finger manipulation, and the blades held firmly by a set screw, when the handles can be detached. Before applying, the inner compressor should be wrapped with gauze, which enables it to cover a wider area and cause less trauma. In applying these forceps, care should be exercised in the amount of pressure brought to bear on the tissues, as necrosis is liable to follow externally as well as internally, by too much pressure. The author has modified the set screw on this instrument by making it work on a ball and socket joint, thus enabling the operator to always have the latch on top irrespective of the tonsil to which the hæmostat is applied.



Tonsillar Hemostat.

a Hard rubber Compress (internal). b External Cushion. c Set Screw. d Detachable Handles.

I have had occasion to apply this hæmostat in three cases. Two years ago, while attending to my clinical work at the Manhattan Eye and Ear Hospital, I received a telephone message requesting me to see a patient at the Grand Union Hotel, who was having a severe tonsillar hemorrhage. I at once secured a Mickulicz-Stoerk tonsillar hæmostat, and rushed over to find a large plethoric man of about thirty-five, bleeding profusely from the left tonsillar area. Every styptic had been employed to control the hemorrhage for at least two hours, but to no avail. In my endeavor to arrest it by hæmostatic pressure, I found it no easy matter to apply it so as to overcome the bleeding entirely. The inner compressor would slip each time I re-

leased the handles. But upon wrapping the inner compressor with gauze, the pressure held, and the bleeding completely stopped. The hæmostat was kept on from three p. m. until twelve that night (nine hours) and then removed, when the bleeding recurred as freely as ever. I again applied and left it on until twelve the next day, when upon removal no recurrence took place. There was considerable discomfort experienced through the night, though the patient had frequent hyperdermics of morphine. Considerable œdema existed for several days externally where the quishon pressed, and all over the cervical area adjacent. The man was too weak to get out of bed for four days, and it took him some months to fully recover from the loss of blood prior to the application of the hæmostat.

The next application was upon a young man of about twenty, from Dr. Chappell's clinic at the Manhattan Eye and Ear Hospital, who was operated upon by one of the house surgeons. His tonsils were large and fibrous and entirely free from attachment to the tonsillar folds. Here the operator cut deeply into the tonsillar tissues, and apparently into a large vascular area, though no one point of bleeding could be determined. The bleeding was so profuse that styptics were not resorted to, and the hæmostat was immediately applied and left on for sixteen hours, when, upon removal, no hemorrhage occurred. In this case there was no constitutional disturbance as in the other, and but little œdema followed, owing to the rapid control of the hemorrhage with the hæmostat.

In the third case the patient was a little girl, aged six, also from Dr. Chappell's clinic. The tonsils were large and fibrous, and free from adhesions. There was no history of hæmophilia, and the patient was in fairly good physical condition. The operation was performed by an assistant surgeon of the Manhattan Eye and Ear Hospital, under gas and ether anæsthesia. The Mathieu tonsillotome was used. The right tonsil was removed first, with but slight hemorrhage. The left tonsil was then removed, and upon its lower extremity, a small piece of either tonsillar tissue or quishion was apparently torn out rather than cut off. It was not the tonsillar fold, as they were intact. Profuse hemorrhage followed this, which did not yield to peroxid, adrenalin, or aceto-tartrate of aluminum. Shortly the operator applied the tonsillar hæmostat, but the bleeding continued, although not so profusely. I was then asked to see the case again, as I had witnessed the removal of the tonsils, but did not remain to see the results. I removed the hæmostat to get a glimpse of the exact bleeding area. The blood welled up from the lower angle of the wound between the pillars in such profuse quantities, that it convinced me no styptic would control it. I wrapped the hard rubber

compressor with gauze, soaked in a mixture of compound tincture of benzoin and iodoform, and applied to the bleeding area. The hemorrhage stopped immediately. By this time the patient had lost considerable blood, and the symptoms of exsanguination appeared, such as great thirst, gasping for breath, etc. We gave her saline enema, strychnine, and one thirty-secondth of a grain of morphia, hyperdermically. These were repeated at three hour intervals, until twelve the next day (twenty-one hours), when we removed the forceps and bleeding recommenced. A new pad soaked in alcohol was adjusted to a Mickulicz-Stoerk hæmostat with detachable handles, and applied as before. The discomfort of the hæmostat was mitigated by the morphine, but the thirst was irritating. The bowels expelled all nutritive enema, and the difficulty in swallowing was intense. The œdema of neck and neighboring tissues was considerable, and the external pad was beginning to excoriate the surface. The hæmostat was removed at two the following day, having been applied for forty-seven hours. Upon removal the hemorrhage had stopped, and no further bleeding took place. A slough in the throat, and small quantities of necrosed tissue came away for several days, followed later by a general purulent discharge. Externally, a slough also began, which occasioned some alarm, for fear that the two would meet and erode a large artery in the way. However, under the influence of ichthyol, externally applied, and the use of a mouth wash internally, both proceeded to heal satisfactorily. In addition to ichthyol, antiphlogistine was applied externally, and it seemed to reduce the œdema rapidly. The external wound was five weeks in healing. Her maximum temperature had been 101° F., pulse 120, and respiration 36.

These cases bear their testimony to the quick efficiency of the tonsillar hæmostat. They also show that it is not so easy to apply it properly, and that too much pressure long continued may result in slough. I am sure that less slough would have resulted, had we used the detachable handle hæmostat first, as not so much pressure is required to hold it in place. The hæmostat is easily carried to an operation, and is a sure means of controlling the hemorrhage—if such occurs. It is the sheet anchor of the throat surgeon, and dissipates all fear as to possible fatal hemorrhage, except in hæmophilia.

I append the report of all alarming hemorrhages following tonsillotomy, collected by Dr. Wright from a search of the Surgeon General's Library at Washington, from 1868 to 1890, consisting of thirty-one cases, also the result of my own investigation from 1890 to date, 23 additional, including the three of my own. This makes a total of fifty-four cases. Out of this number, six have resulted fatally. Two of the six deaths occurred before the modern methods of removal were introduced, the other four, under the present surgical methods.

It is interesting to report that the patient operated upon by Dr. Fuller, of Brooklyn, in Dr. Wright's report, when the common carotid was ligated, and saline transfusion into radial vein was given to control the hemorrhage, was again operated on 15 years after for tonsillar abscess by Dr. Wright, which was followed by an alarming secondary hemorrhage into the cavity of the abscess, and was, with great difficulty finally controlled.

CASES OF ALARMING HÆMORRHAGES AFTER AMYGDALOTOMY.*

Sex.	Age.	Disease or condition requiring opreation.	Instrument Used.	Ultimate result.	Operator.	Reference and Remarks.	Method used for control of Hemorrhage.
			UNITED STATES.—17 cases.				
Female	Middle	Hypertrophy of right tonsil.	Amygdalotome (no pattern ment'ned)	Recovery.	A. M. Fauntleroy	Am. Med. Weekly, Louisville, ii, 1875, p. 498. Patient was very full blooded.	Ice packing upon neck employed.
Male	18	Hypertrophied tonsil.	Tonsillo-Guillotine	Recovery.	L. D. Kastenbine	Louisville Med. News, i, 1876, 280, 281.	Hæmorrhage stopped by patient walking home with mouth open.
Male	25	Hypertrophied tonsil.	Tonsil bistoury	Recovery.	G. M. Lefferts	Arch. of Laryngol., New York, iii, 1882, 37.	Pressure applied directly upon surface.
Male	35	Hypertrophied tonsil.	Mackenzie's amygdalotome.	Recovery.	G. M. Lefferts	Hæmorrhage from artery at right stump.	Artery twisted.
Female	Young		Amygdalotome	Recovery.	G. M. Lefferts		Artery twisted.
Male		Hypertrophy of right tonsil.	Amygdalotome	Recovery.	G. M. Lefferts		Artery twisted.
Female	30	Enlargement of left tonsil, acute inflam.	Mackenzie's modification of Physick's guillotine.	Recovery.	Clinton Wagner	Tr. of the Am. Laryngol. Assoc. 1886, New York, 1887, viii, 185.	Artery twisted with artery forceps.
Male	25	Hypertrophy of tonsil.	Mathieu's amygdalotome.	Recovery.	S. E. Fuller	Amer. Jour. of the Med. Sci., Phila. xcv, 1888, 357.	Carotis commun. ligated; saline solution (12 oz.) transfused into radial vein.
Male	21	Quinsy	Mathieu's amygdalotome.	Recovery.	L. E. Blair	Albany Med. Ann., ix, 1888, 41–47. Hæmorrhage from left tonsil.	Ice and compress.
Male	27	Amygdalitis	Mathieu's amygd'lot	Recovery.	L. E. Blair	Hæmorrhage from right tonsil.	Stopped by compress.
Male	22	Hypertrophy of both tonsils.	Volsella and angular scissors.	Recovery.	E. W. Clark T. M. Maakoe	N. Y. M. J., xlviii, 1888, 7.	Performed ligation. Ligation of stump.
Male	Young		Physick's amygdalotome.	Recovery.	Daly	Tr. of the Am. Laryngol. Assoc., 1898, N.Y., 1889.	Compress.

CASES OF ALARMING HÆMORRHAGE AFTER AMYGDALOTOMY.—CONTINUED.

Sex.	Age.	Disease.	Instrument used.	Ultimate result.	Operator.	Reference and Remarks.	Methods used for control of hæmorrhage.
Male	34		Amygdalotome (no pattern ment'ned.	Recovery.	D. Bryson Delavan.	Tr. of the Am. Laryngol. Assoc., x, 1888, N. Y., 1889, 153-163.	
Female	7		Fahnestock's	Recovery.	D. Bryson Delavan.	Patient was a hæmophile.	
Male	Adult		Guillotine (no make mentioned).	Recovery.	R. J. Lewis	Med. News, Phila., liii, 1888, 640.	Application of a tenaculum through base of tonsil and twisting it.
Male				Recovery.	Alden March	Albany Med. Ann., ix, 1888, 41-47.	
Male	48	Tonsillar hypertrophy.	Mathieu's amygdalotome.	Recovery.	F. Park Lewis	J. of Ophth., Otol., and Laryngol., N. Y., i, 1889, 115-117. Hæmorrhage, 4 qts. in 17 hours from left tonsil.	
AUSTRIA.—1 case.							
Male	31	Syphilitic enlargement of right tonsil.	Hook and bistoury.	Recovery.	Guntner	Oesterr. Zeitschr. f. prakt. Heilk., 1872, xviii, No. 52, p. 839. Patient a hæmophile, syphilitic.	Common carotid ligated.
FRANCE—8 cases: 6 recoveries, 2 fatal.							
Male	21	Hypertrophy of tonsils.		Recovery.	Gayat Jarjavay	These, Paris, 1868, No. 275, p. 52.	
Male	Young	Hypertrophy of tonsils.	Amygdalot.; operation by patient himself.	Recovery.	Mary Verneuil	These, Paris, 1875, No. 29. Right tonsil removed.	Hæmorrhage stopped by perchloride of iron.
Male	35			Recovery.	Mary Broca	1869. Both tonsils removed; patient a hæmophile.	Direct application of ice.

CASES OF ALARMING HÆMORRHAGE AFTER AMYGDALOTOMY.—CONTINUED.

Sex.	Age.	Disease.	Instrument used.	Ultimate result.	Operator.	Reference and Remarks.	Methods used for control of haemorrhage.
Female	20			Recovery.	Mary Broca	No details.	
Boy				Recovery.	Ricordeau Reclus	These, Paris, 1886. Both tonsils removed.	
Male	24-25			Fatal	Ricordeau Broca	1879. No details.	
Male	8½	Double tonsill'r angina; hypertrophy.	Amygdalotome (no pattern ment'ned)	Fatal	Broca	Nov., 1879. Cause of hæmorrhage, anomalous internal carotid.	
Male	20			Recovery.	Saint-Germain	No details.	Ice applied around throat.
GERMANY—1 case.							
Male	31		Cautery (probably thermo-cautery).	Recovery.	Werner	Oct. 11, 1887, Med. Cor.-Bl. d. würtemb. arztl. Ver., Stutt., lviii, 1888, 241.	Manual compression of carotis for 10 days.
GREAT BRITAIN—3 cases.							
Male		Hypertrophy of left tonsil.	Bistoury	Recovery.	Wharton P. Hood	Lancet, 1870, vol. ii, 600. Small calculus within tonsil.	Vomiting stopped hæmorrhage.
Male				Recovery.	Wharton P. Hood	No details; both tonsils excised.	Sulph. of zinc administered; vomiting, hæmorrhage stopped.
Male	34	Chron. follicul'r amygdalitis.	Mackenzie's for right tonsil and tonsilsickle for left tonsil.	Recovery.	J. Walker Downie	Edinb. M. J., xxxii, 1886-'87, 116.	Actual cautery.

CASES OF ALARMING HÆMORRHAGE AFTER AMYGDALOTOMY.—CONTINUED.

Sex.	Age.	Disease.	Instrument used.	Ultimate result.	Operator.	Reference and Remarks.	Methods used for control of haemorrhage.
			SWEDEN—1 case.				
Female		Hypertrophy of tonsils.	Forceps and blunt bistoury.	Recovery	Lidon	Hygeia, Stockholm, xlii, 1881, p. 256.	Ligation of common carotid.
Male	Adult	Hypertrophy	?	Recovery.	M. Lucas	Championniere, La Semaine Medicale, May 7, 1890.	Tampon, ergotine, pressure.
Male	11	Hypertrophy	Mack, tonsillotome.	Recovery.	William H. Hall	N. Y. Medical Jour., Sept. 20, 1890.	Pressure, ice, styptics.
Female	18	Hypertrophy	Mack, tonsillotome.	Recovery & anæmia	William H. Hall	N. Y. Medical Jour., Sept. 20, 1890.	Persul. of iron, ice, pressure, gallic acid.
Male	23	Hypertrophy	Mack, tonsillotome.	Recovery.	M. Thorner	The Cin. Lancet Clinic, Oct. 18, 1890.	Syncope stopped haemorrhage.
Male	25	Hypertrophy	Mack, tonsillotome.	Recovery.	M. Thorner	The Cin. Lancet Clinic, May, 1891.	Tanno gallic acid, iron persulphate, tonsion with forceps.
Female	?	Hypertrophy	?	Recovery.	Mr. Buissevet	Revue de Laryng, Nov. 15. 1891. Grave hæmorrhage, convulsions, aphasia.	Cocaine.
Female	8	Hypertrophy	Mack, tonsillotome.	Recovery.	P. R. W. DeSanti	Lancet, Jan. 13, 1894. Secondary hæmorrhage, 24 hours after. Unconscious, convulsions, air hunger.	Tanno gallic acid.
Female	15	Hypertrophy	Mack, tonsillotome.	Recovery.	P. R. W. DeSanti	Lancet, Jan. 13, 1894. Secondary hæmorrhage 48 hours after, and continued 4 days.	Tanno gallic acid.

CASES OF ALARMING HÆMORRHAGE AFTER AMYGDALOTOMY.—CONTINUED.

Sex.	Age.	Disease.	Instrument used.	Ultimate result.	Operator.	Reference and Remarks.	Methods used for control of haemorrhage.
Male	19	Hypertrophy	Mack, tonsillotome	Recovery.	P. R. W. DeSanti	Lancet, Jan. 13, 1894.	
Male	6	Hypertrophy and struma	Tonsillotome	Fatal	A. Barkan	(San Francisco) Occidental Med. Times, March, 1894. Death 12 hours after operation.	Cautery.
Female	Adult	Hypertrophy	Mathieu, tonsillotome.	Recovery.	A. W. Calhoun	Atlanta Med. and Surg. Jour., Aug., 1895. Secondary hæmorrhage 5 days after operation.	
Male	31	Hypertrophy	Mathieu, tonsillotome.	Recovery.	F. A. Bottome	Medical Record, Aug. 29, 1896. Secondary hæmorrhage [illegible] hours after operation.	
Female	49	Abscess	Galvano Cautery	Recovery.	J. W. S. McCullough	Medical Record, March 20, 1897. Secondary hæmorrhage 74 hours after operation.	
Female	20	Hypertrophy	Tonsillotome	Recovery.	Jules Broeckaert	La Belgique Medic., Nov. 20, 1897. Secondary, 7 days after operation.	Pressure, iron, ice, ergotine, antipyrin.
Male	25	Hypertrophy	Tonsillotome	Recovery.	R. C. Myles	Transactions Am. Laryn. Rhinol. and Otol. Soc., June 2 and 3, 1899.	Electric cautery, tanno gallic acid, compress.
Female	11	Hypertrophy	Tonsillotome	Recovery & anæmia	R. C. Myles	Transactions Am. Laryn. Rhinol. and Otol. Soc., June 2 and 3, 1899. Secondary, fourth day; whooping cough, anæmia, one year.	

CASES OF ALARMING HÆMORRHAGE AFTER AMYGDALOTOMY.—CONTINUED.

Sex.	Age.	Disease.	Instrument used.	Ultimate result.	Operator.	Reference and Remarks.	Methods used for control of haemorrhage.
Male	15	Hypertrophy and bleeder.	Tonsillotome	Fatal	J. A. Stuckey	Transactions Am. Laryn. Rhinol. and Otol. Soc., June 2 and 3, 1899. Secondary, 7 hours after; Temp. 101 at time; venous oozing.	Cold peroxide, ergotine, morphine, strichnia, persul of iron.
Male	Adult	Hypertrophy	?	Recovery.	J. Quinlan	Laryngoscope, April, 1900.	
Male	23	Hypertrophy	Galvano Cautery	Recovery.	M. D. Lederman	Laryngoscope, April, 1900. Secondary, 5 days after.	Cocoaine, alum, ice.
Male	7	Hypertrophy	Tonsillotome	Recovery.	A. H. Urban	American Med., July 4, 1903. Secondary, 25 hours after.	Paquelin cautery.
Male	10	Hypertrophy	Mackenzie tonsillotome.	Recovery.	R. McKinney	N. Y. and Phil. Med. Jour., Dec. 26, 1903. Secondary hæmorrhage, 4 days after.	Monsel's solution.
Male	7	Hypertrophy	Mackenzie tonsillotome, scissors.	Recovery.	R. McKinney	Chloroform anæsthesia. Profuse bleeding.	Monsel's solution and ice.

*Since this table was compiled I note the report of a case of hæmorrhage after amygdalotomy, in a child seven years old, during active inflammation of the tonsils. (Moure, reference in Jour. of Laryng., 1890, No. 8.)

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Stated Meeting, December 23, 1903.

WALTER F. CHAPPELL, M.D., Chairman.

Chronic Antrum Suppuration; Radical Operation.

DR. T. PASSMORE BERENS presented a patient upon whom he had done the Jansen radical operation on November 21 for chronic suppuration of the antrum. The antrum had been opened six years ago by a colleague, and had been discharging pus copiously since that time. On coming to him there were vague pains over the eye and in the occipital region. The first packing was done four days after the operation, the second five days later, and there had been none since then. The inferior turbinate was preserved with the exception of the bone. At present, there was a slight muco-purulent discharge from the antrum. The antrum of Highmore, the ethmoid and the sphenoid were opened on the right side.

Rupture of an Antrum Abscess into the Orbit in Infant. Operation.

DR. THOMAS J. HARRIS presented several patients. The first was a child of five months referred to him at the Manhattan Hospital from the Presbyterian Hospital, with a history of the child's having fallen out of a chair, striking the face, thirteen days before. When first seen by him, there was marked exophthalmos associated with high temperature. The child was chloroformed, and the abscess was opened through incision under eye and a considerable quantity of foul pus evacuated. This reduced the swelling in the orbit markedly. Further examination showed that there was involvement of the antrum. The second operation was done under chloroform about four days later, and at this time it was ascertained that this acute abscess of the antrum had ruptured through the roof of the antrum into the orbit, the orbital floor being largely absorbed. There was no diseased bone, but a good deal of granulation tissue, which was curetted away. The temperature subsided promptly, and the child appeared to be convalescing satisfactorily. It was worthy of note that this young infant had taken chloroform twice without accident.

True Papilloma of the Naso-Pharynx.

The second patient was a woman of sixty who had come to him a few weeks ago with a history of slight pricking in the throat and, on one occasion, of a little bleeding. There was no constitutional taint or disturbance. Examination revealed behind the uvula a soft cauliflower growth, which was not sensitive and did not bleed easily. The case was thought to be a sarcoma. A portion of the growth was examined by Dr. Henry T. Brooks, who reported it to be a pure papilloma of the naso-pharynx. So far as he could find, only three cases of papilloma of the naso-pharynx had been reported. He still felt in doubt regarding the microscopical diagnosis. The growth diminished decidedly under four or five applications of the X-ray.

Antrum Fistula of Obscure Origin.

The next patient was presented on behalf of DR. MANSON. He was a young man who had always been healthy, and had no specific history. Four weeks ago he lost the incisor on the right side, and with it a considerable amount of bone. As a result, the food regurgitated through the nose. Examination showed a fistula through the alveolus entering the antrum and passing through the outer wall of the nose. There was no history and no sign of antrum disease. It had occurred to the speaker that this might be a rather rare form of bone disease, or else that there had been a trauma not mentioned in the history.

DR. C. G. COAKLEY presented some curettes that he had found useful for work on the accessory sinuses.

Nasal Polypus.

DR. LINN EMERSON presented this specimen, taken from a coachman, thirty-five years old, who gave a history of having had polypi for thirteen years, and complete nasal obstruction for eight years. On coming under observation, there was the so-called "frog face," but without any involvement of the sinuses. His general health was excellent. There was a marked deviation of the septum to the right, and both nasal cavities were completely filled with polypi. At the first sitting about one dozen polypi were removed from the left side, and a week later about half as many from the other side. Subsequently the left middle turbinate was removed and a number of ineffectual attempts were made to get a snare around the polypus. After a rest of a week the right middle turbinate was separated with scissors. To his surprise, the specimen here presented then dropped into the pharynx. It weighed 255 grains, and was found to have embraced the posterior edge of the septum, thus explaining the complete obstruction of both nostrils.

Alarming Hemorrhage Following Tonsillotomy. Its Cause and Care.

DR. HARMON SMITH read a paper with this title. *This paper appears in full in this issue of* THE LARYNGOSCOPE, *page 121.*

DISCUSSION.

DR. JONATHAN WRIGHT said that this was a subject which had interested him deeply. He thought the author of the paper had recommended the only really efficient method of checking tonsillar hemorrhage when it was of a dangerous character. It was quite remarkable how many cases of severe hemorrhage of this kind had escaped death. A few years ago he had looked up the subject of hemorrhage from adenoid operations, and had found at that time 16 deaths, very many more from tonsillotomy, although the latter complication had received a great deal more attention in the literature. This frequency of hemorrhage as a sequela of adenoid operations was probably to be explained by the lack of attention to the post-operative treatment, such, for example, as the placing of the patient's head in such a position that if hemorrhage occurred it would come out anteriorly upon the pillow and so attract the attention of the attendant. The hemorrhages after tonsillotomy had been, for the most part, in adults, whereas the reverse was true of the cases of hemorrhage following adenoid operations. The tendency to hemorrhage in tonsillotomy upon adults was said to be due to the increased proportion of fibrous tissue, but microscopical study hardly bore this out.

DR. J. E. NEWCOMB said he recalled hearing Dr. W. H. Daly say at a meeting held some years ago that every one who persisted in removing tonsils would sooner or later meet his Waterloo. Personally, he had long done this operation before coming to grief, and then he had encountered two bad cases within one week. In one of these the patient bled a little after the operation, but it seemed to be of no consequence. He had barely gone away from the house when he was again summoned, and found that the patient had bled to faintness, and that then the bleeding had ceased. Mention had recently been made of the sewing of the pillars through and through so as to bring them down and make a sort of compress. It had seemed to him that at times the question of fibrous tissue in the tonsils was dependent rather upon the number of previous attacks of tonsillitis than upon the age of the person. He had been unfortunate enough to lose one child from secondary hemorrhage after an adenoid operation. The case was from the dispensary and the family very ignorant. The child lay on its back and bled internally. Since that time, now about ten years ago, he had kept track of the literature of this subject, and had found one or two such cases reported each year.

DR. M. D. LEDERMAN said that in 1894 he had reported a case which showed that even after the use of the electro-cautery there might be severe hemorrhage. His patient was a medical student of twenty-one years, who had the largest pair of tonsils he had ever seen. During inspiration and expiration they moved as if on pedicles. The operation was done without difficulty, and there was not much bleeding owing to the use of the galvano-cautery. Everything went well until the fifth day, when he swallowed a piece of toast. This scraped away the eschar and produced an alarming hemorrhage. A physician in the neighborhood applied a cocaine solution, which seemed to stop the hemorrhage. However, it recurred about one hour later, and when he saw the patient there was still some hemorrhage, which he checked with a twelve per cent solution of alum. In another case of alarming hemorrhage the subject was a hæmophiliac. After pressure for some time the hemorrhage ceased, but recurred during the night without being noticed by the family. When found the next morning the boy was exsanguinated and almost pulseless. He rallied promptly under appropriate treatment. According to the history, obtained subsequently, the boy had previously bled for a week after extraction of a tooth. In a case occurring a few days ago in the practice of a colleague the operation was done after an attack of acute tonsillitis, and just after the menstrual period. He was of the opinion that this operation should never be done while there was acute inflammation present.

DR. FRANCIS J. QUINLAN recently had seen two such cases of post-operative hemorrhage in the practice of an eminent surgeon of this city, the other following the operation in an hour and leaking so as to almost exsanguinate the patients. The operation of tonsillotomy or rather as it should be, tonsillotomy is apt to be treated in too trifling a manner by the physician and surgeon to-day, and there is no spot in the anatomy of man so difficult to arrest bleeding as it is in this region, hence the responsibility of the operation when such accidents do take place. This operation is done by him whenever possible under full anæsthesia and in the upright position, a careful inspection of the parts is made following the excision and the patient kept in bed for two days and every precaution taken to keep the parts at rest and induce early convalescence.

DR. C. E. QUIMBY said that from an experience of this kind he had learned that two silver forks and a cork made an admirable substitute for the tonsillar hæmostat until that instrument could be procured.

DR. WENDELL C. PHILLIPS said he never undertook a tonsillotomy until he was fully acquainted with the history of the patient and could

place the latter where proper attention could be given in the event of an emergency of the kind under discussion. He dreaded to do a tonsillotomy or an adenoid operation in private house, and not see the patient again until the next morning.

Some Recent Observations on the Nasal Septum in Non-Adenoid Races.

DR. HENRY L. SWAIN, of New Haven, Conn., was the author of this paper.

DR. W. FREUDENTHAL said he had been very much interested in this paper because, at the present time, he was studying the skulls at the Museum of Natural History. The old idea of overarching of the palate had never appealed to him. He understood that the flat-head was produced by confining the head of the infant by boards placed anteroposteriorly and laterally. He had personally examined the septum in about 1,200 skulls of aborigines from all over America. In about 400 of these skulls the septum was missing or not well preserved, so that these must be excluded. Of the remaining 800 he had found a great variety of distorted septa in 245 skulls. This is in distinct contradiction to the old teachings. These deviations were found in other tribes besides the flat-heads.

DR. C. E. QUIMBY thanked Dr. Swain for his instructive paper and expressed his gratification at the admission that developmental defect was the main cause of deflection of the septum. At the last meeting he had personally only dared to say that it was sometimes the cause of such deflection. He would like to ask the author of the paper if it were not true that when a tissue had filled a cavity a compression force limited its growth beyond that point. This, he thought, might, perhaps, explain why in the Indian there was not so much distortion.

DR. M. D. LEDERMAN said that some years ago he had read a paper before a dental society in which he reviewed some of the statistics bearing on this subject. At that meeting, Dr. Hart showed an impression that he had made before and after an adenoid operation within a period of six months, and this showed a wider and a lower arch after the operation without any correction of the teeth.

DR. SWAIN, in closing, said that the septum behind was ossified at birth, in the part which was made by the vomer, whereas in front it was not osseous for years in some cases; hence, it was more frequently bent. Many errors had arisen in clinical observation in estimating the height of the palatine arch, because, to the eye, the arch having a broad base always appeared shallower than an arch of equal height but narrower base.

BRITISH MEDICAL ASSOCIATION.

Seventy-first Annual Meeting, held at Swansea, July 28-31, 1903.

SECTION OF LARYNGOLOGY AND OTOLOGY.

PATRICK WATSON WILLIAMS, M.D., President.

(Continued from page 85.)

Discussion on the Technique of Operations on the Temporal Bone in Suppurative Middle Ear Disease.

PROFESSOR HARTMANN said: Dr. McBride has given us a detailed description of the history and of the operation for treating middle-ear suppuration. After his lucid review and description it is unnecessary for me also to describe the operation. I will therefore confine myself to some practical points, and to showing you some preparations and illustrations of them.

Concerning acute inflammation: in opening the mastoid, the antrum as a rule should be opened so as to allow free communication with the tympanic cavity. Only in those cases of abscess of the mastoid in which the internal wall of the abscess during the operation appears to be healthy, and in which there is no swelling of the posterior and superior wall of the meatus and of the upper part of the tympanum can we confine ourselves to the removal of the diseased bone. In other cases the antrum should be opened. If there are any symptoms or signs pointing to the extension of suppuration to the middle or posterior cranial fossa, then the bony parts should be removed until the dura mater is exposed.

In order to effect a rapid and lasting cure by this operation, the opening of the cavity of the mastoid must be made very wide. All the bone from the diseased parts, chiefly the posterior and inferior edges of the bony cavity, must be removed, and not only these parts, but also the external part of the posterior wall of the meatus. By so doing you obtain an extension of the soft integuments which line and cover the cavity.

As regards the treatment of chronic suppuration of the middle ear, we are indebted to the surgeons Kuster and Bergmann for having shown to us the way to obtain a sure and permanent cure. Following them, Zaufal and Stacke gave us an exact description of the operation which we now call the "radical" operation, and which was based upon the peculiar anatomical and pathological conditions.

They described in detail the various steps of the operation, what we added later was chiefly the enlargement of the external meatus by plastic methods such as Körner's flap. The principle in the radical operation is that all the affected parts of the tympanic cavity and mastoid are rendered perfectly accessible and visible.

For this purpose (1) all bone external to the affected parts must be removed; (2) the external meatus must be considerably enlarged. Whether you take away the bony parts with a gouge or with the bur depends upon the experience and practice of the surgeon. The bur may be preferred for working in the deeper parts, for removing the bridge between the antrum and the internal part of the meatus, and for removing the external wall of the attic, but these parts can be equally well removed with small gouges. The use of the bur can scarcely be avoided in opening the vestibulum of the labyrinth. The bur is also useful and convenient for smoothing the whole of the surface of the cavity.

In the literature we have many descriptions, illustrations, and measurements demonstrating the danger of injuring the facial nerve and the semicircular canals. I have myself made measurements on a large number of preparations, and have given the number of millimetres the facial nerve and semicircular canals are distant from the external surface of the mastoid and the suprameatal spine. But I do not wish to attach too much significance to such measurements; of much more importance than the description and measurements is the experience acquired by examination of specimens. Every one who wishes to perform operations upon the temporal bone should have made many *post-mortem* examinations of this region and thereby have acquired a mental image of the minute anatomy of the parts. In that way only can he avoid with the greatest possible certainty the danger of injuring important structures. I have brought with me several preparations which demonstrate the parts we have to deal with:

[Dr. Hartmann here demonstrated a series of anatomical preparations illustrating the surgical anatomy of the temporal bone.]

1. A preparation in which the bone is opened in the same manner as in the radical operation. The posterior wall of the meatus has been removed, the external part entirely, and the internal with the exception of the facial protuberance. Moreover, the external wall of the antrum and the attic is removed.

2. A preparation in which the posterior wall of the meatus has been left, but the facial and semicircular canals are opened.

3. The same preparation without the posterior wall of the meatus.

The preparations show that the facial canal is only a few millimetres distant from the internal and posterior wall of the meatus, and that dissection of the inner wall of the meatus can scarcely be done without injuring the facial nerve. In most cases such chiseling is not necessary. Only when we must have a way to the oval window the chiseling of the internal and posterior wall is to be considered.

The first operations for the treatment of labyrinthine suppuration were published by Jansen, and we have now a very complete description of these operations by Hinsberg. We can open the vestibulum without difficulty by removing the stapes from its window; if it is not to be seen we can open the vestibulum by the burr, but must avoid going upwards so as not to hurt the facial nerve; if we go too deeply the carotid may be injured. In the majority of cases purulent inflammation of the labyrinth has extended from the mastoid through the semicircular canals, therefore, as a rule, the operation must be performed from the latter point. The horizontal semicircular canal would be opened first. We must follow it just behind the facial canal until we reach the vestibulum. A probe can then be introduced coming out through the oval window. By following the anterior part of the horizontal canal one comes very easily into the vestibulum. These proceedings can be better demonstrated on preparations than they can be described.

[Dr. Hartmann here demonstrated the following preparations]:

1. A preparation in which the radical operation has been performed and the labyrinth has been opened by means of a bur. The operation was performed so that at first the horizontal canal was opened, and then the anterior branch was followed, and the labyrinth having been entered, the posterior and inferior part of the surrounding canal was removed.

2. A vertical section cut parallel to the meatus, showing the vestibulum open.

3. Some horizontal sections through the vestibulum and horizontal canals.

It will be observed from all these specimens that the operations must be performed in the most careful manner, for if we go too deeply we are in danger of opening the internal meatus, and if we go down there is the danger of hurting the facial nerve.

Before performing the operation for chronic suppuration I would recommend that the tympanic cavity and the antrum should be cleansed as thoroughly as possible by means of a cannula such as I have designed. I have seen many cases in which the operation for chronic suppuration of the middle ear had been advised, but after

washing out the tympanum and the antrum in the way I have suggested the discharge ceased, and by a few repetitions of this cleansing the necessity for an operation was obviated. I have met with similar experiences in the treatment of suppuration of the autrum of Highmore.

During the operation we should remove all inspissated matter and cholesteatomatous masses by syringing, and not with the spoon. In this way we can save the surface, which is covered with epithelium. This epithelium is of service in promoting healing.

As a rule we have after an operation several spots which are covered with epithelium, the inferior and superior wall of the meatus, also a small piece of the internal part of the posterior wall, some parts of the surface of the internal and upper wall of the tympanic cavity and the antrum, and from these spots epidermization can extend. When we enlarge the opening of the meatus and remove the edges in a manner similar to what I recommended for the operation of acute abscess the soft integuments can extend inwards, and only a small cavity is left to close. The best grafts are the natural extensions from the soft parts in the cavity; the enlargements of the external meatus may be done by Körner's flap or by the Y cut of Seibenmann. The more you enlarge the meatus the more you diminish the external surface of the wound cavity, and the easier and quicker can epidermization of the internal surface take place, by extension from the edges of the enlarged meatus.

For making Körner's flap I use an instrument which I recommended some years ago. It serves to fix the membranous part of the meatus and very much facilitates the cut through it.

Healing by means of skin grafts is not now so much performed in Germany as formerly. By proceeding in the manner I have recommended to you, so that you leave some parts of the internal surface covered with epithelium, and by removing the edges so that the whole cavity is rendered very small, and by enlarging the external meatus considerably, you seldom have to resort to skin grafting, and the wound behind the concha can be sutured after the operation.

Dr. Dundas Grant said the Section might consider itself fortunate in fact that Dr. McBride and Professor Hartmann had accepted the responsibility of introducing that discussion.

Dr. McBride, in taking events in historical sequence, had given them an admirable *exposé* of the gradual development of operations now practiced on the temporal bone in suppurative middle-ear disease, so that his advocacy had not been confined to one pet method, but he had given appreciative consideration to all.

Professor Hartmann had taken a very practical course in dividing the operations into two groups, according as they were practiced for acute or for chronic inflammation. All would agree with him that these operations were entirely different. The operation for acute suppurative inflammation was one which could hardly be overestimated, seeing its extraordinary efficacy in leading to a cessation of discharge and to a recovery of the organs of hearing to little short of their integral state. It might be said that the radical operation was too often performed; it was his opinion that the non-radical operation for acute inflammation was performed too seldom. Most of them must have been surprised, when they had been led to open the mastoid in a case of persistent acute suppuration of two or three weeks' standing, to find to what an extent the interior of the mastoid portion of the temporal bone had broken done, so that the sigmoid sinus was exposed, and sometimes, though more rarely, the dura mater was also laid bare. Jansen had taught with what frequency extradural abscess resulted from acute suppuration, and his somewhat alarming statistics would be readily comprehended by one who had performed the operation Dr. Grant referred to with any degree of frequency. When performed with care the operation presented no particular difficulties, and in the presence of threatening symptoms, a general surgeon of even the most modest acquirements ought to be prepared to carry it out. In a considerable proportion of Dr. Grant's cases it had been necessary to make any intentional opening of the antrum, as he had found a condition answereing exactly to that described by Politzer as resulting from influenza—namely, a large comparatively smooth-walled cavity filled with pus, and not apparently communicating with the antrum. The mere presence of this seemed, however, to have kept up the suppuration in the middle ear, which cleared up as soon as this cavity was laid open, emptied and drained. As a rule, however, he made an opening into the antrum in order to assure himself as to its condition, frequently finding it so comparatively normal as to preclude the necessity for opening it more freely. In other cases, a space filled with granulation tissue extended right up to the aditus, and a reasonable amount of clearance has, he thought, been found beneficial. He did not, however, think that it was advisable to syringe forcibly through from the mastoid cavity to the tympanum, as there was such a remarkable tendency to rehabilitation on the part of the latter when once the disease in the mastoid had been removed. He usually plugged the cavity for about forty-eight hours, then removed this and pressed the skin down into the hollow by means of gauze dressings, a strip of lint moistened with

so-called "red wash" being introduced down to the bottom. He had no experience of the primary suture, but considered its trial quite justifiable.

Very different was it with the operation for chronic inflammation; this, which had to be thorough, was one which tested the technical capacity of specialists to its utmost degree, and the surgeon who would attempt to do it without a good deal of special study of the matter was likely to meet with considerable difficulties and unsatisfactory results. The main principles of the operation had been tersely laid down by Professor Hartmann, namely, that all the bone external to the affected part must be removed. The method by which this was done was probably now familiar to most of those present, and he was bound to say that he preferred to work down upon a firm bent probe, such as the one devised by himself, or Stacke's guard, which protected at the same time the facial nerve and the external semi-circular canal; but Stacke's guard was in itself capable of doing damage, and unless it was held by an experienced assistant, the danger, of course, was that of damaging the facial nerve; the guard itself might be the agent in doing this if it was roughly manipulated while in the aditus, because immediately below it lay the nerve, and, by a lever action which would be readily intelligible, the toe of the guide might be pressed down with considerable force upon it. There was another source of difficulty which had, so far as his reading went, been described in only one systematic work, namely, that of Mr. Mark Hovell; this was the possibility of introducing the guard or probe into the sinus tympani, the cavity lying below the facial nerve and which was sometimes of considerable size either from peculiarity of structure or from the effects of disease. Various forceps had been recommenced for cutting away the posterior wall of the meatus, but he was inclined to think there was nothing better than a flat chisel, which in this part of the operation had a peculiar advantage of its own, just as the hollow one had, for instance, in the removal of the outer wall of the attic.

The question of "plastic" had probably not yet been entirely settled. Personally he had found Körner's flap very satisfactory, and as a rule he saw no object in thinning it down, as it was not well to leave an unnecessarily large cavity posterior to the auditory meatus; a large cavity there simply served as a sort of trap for epidermic remains and collections of cerumen. Mr. Ballance's flap had seemed to him theoretically to be hinged in the wrong direction, but practically it acted extremely well; one might criticize it as having a tendency to draw the anterior wall of the membrano-cartilaginous

meatus backwards, and in this way detach it from its osseous bed. To prevent this he had made a logitudinal cut along the upper wall of the meatus, so as to detach the flap from the anterior part. If it was necessary to have a very large meatus, this could be done by making a large Körner's flap extending into the concha, and dissecting the underlying tissues from its skin covering. He had two cases under his observation in which he had done this with the most complete success so far as enlargement was concerned, but really to a very much greater extent than was at all necessary. The result was very unsightly, although it fulfilled the purpose of admitting the air to the cavity in the most perfect degree.

He brought before the Section at its last meeting in Manchester some views with regard to the retention of the lining membrane of a cholesteatoma cavity when this was complete and comparatively homogeneous. Although it was not a good skin, it was a fair substitute for it, and was calculated in such cases to take the place of the skin-graft devised by Mr. Ballance. It had been stated that the bone underneath the cholesteatoma matrix was always diseased, but in a case recently under his care he carefully pulled out the whole cholesteatoma, and found the bone beneath it to be perfectly smooth, as if the cavity in which the cholesteatoma lay had been hollowed out by means of a bur. In this case he departed from his usual rule of leaving the matrix *in situ*.

In regard to Mr. Ballance's grafting, he could only say it had given him better results than any other method that he had employed, and that in the case of quite a large cavity other than cholesteatoma, to which he had referred, he considered it indispensable. When, however, the cavity was small, he thought that it might be got to heal in so short a time a time as to justify the omission of a second operation.

MR. ELSWORTH thought just as good a surface could be got with the gouge and chisel as with the bur, practically, by planing off thin shavings of bone with the hand—by wrist action chiefly—and using part of the instrument as a fulcrum. He showed sections of temporal bones displaying the "accessory antrum" described by him. It lay above and behind the antrum proper and external to it, abutting on the sigmoid sinus. He also described a vein which skirted the accessory antrum, originating in the spongy tissue of the periosteum surrounding the antrum proper, and opening into the sigmoid sinus just below the knee. This vein was, he thought, the channel of infection in those cases of sigmoid thrombosis without erosion of the sigmoid groove. This vein was a constant vessel, and generally

opened as described; but it might also end in several other ways, for example, in the superior petrosal sinus running on the temporo-sphenoidal surface of the temporal bone, and sometimes, he thought, giving rise to temporo-sphenoidal abscess.

Professor Gluck, as showing the extent to which operative interference might be successfully practiced, narrated the following cases:

Case 1.—A woman aged 42 came under his care with erysipelas of the head originating from eczema of the meatus. For twenty-eight years she had suffered from otorrhoea with formation of cholesteatoma. She had rigors, headache and vomiting. There was fetid otorrhoea, and the whole tissues of the neck along the carotid sheath were swollen and tender. Professor Gluck first opened the mastoid and cleared out the cholesteatoma, but did not open the cranium, fearing extension of the erysipelas to the meninges. The erysipelas quickly subsided, but rigors continued to occur; the neck was stiff, and delirium and retention of urine came on, and there was difficulty in swallowing from increasing infiltration of the neck. The parts were fully exposed by longitudinal incision over the carotid sheath and transversely across the occiput. The mastoid was removed and also the posterior part of the foramen lacerum posticum with the styloid process. A large part of the squama came away and the petrous temporal was removed together with the labyrinth and facial canal, as it was carious and infiltrated with pus. The dura mater was freely exposed, also the transverse sinus, the genu and the jugular bulb a far as the bend, all extradural pus having been evacuated. The external jugular was tied and cut. The internal jugular could be felt as a hard cord, but contained some blood; the superior, thyroid, lingual, and common facial veins were full to bursting. The latter were tied and cut after ligature of the internal jugular at the bend (angular necrosis). Drawing the carotid and vagus inwards the jugular vein with the bulb and the contained suppurating thrombi were removed. In removing the jugular bulb the internal carotid in its bony canal had to be secured with two stitches on account of severe hemorrhage in removing the jugular bulb and clearing out the sigmoid sinus, it was found that the thrombosis extended in to the inferior petrosal and also into the transverse sinus, and they were accordingly cleared out, the latter as far as the torcular Herophili; the free bleeding being controlled by iodoform gauze plugs. The patient made a good recovery; the giddiness and swaying due to removal of the labyrinth disappeared, and except for facial paralysis the patient was well. The case showed the importance of removing all diseased bone even as far as the apex of the petrous temporal, and

also the advantage of preliminary ligature of the internal jugular before opening the sinus.

CASE II. *Nerve Grafting for Facial Paralysis.*—A boy, W. S., was operated on by Professor Gluck in 1869 for cholesteatoma and extradural abscess. The boy made a good recovery but complete facial paralysis followed the operation. In July, 1901, a nerve-grafting operation was undertaken. The branch of the spinal accessory which supplies the trapezius was found and isolated. Next the pes anserinus major was exposed and the facial trunk traced back. The nerves were divided and the peripheral end of the facial was joined exactly to the central end of the spinal accessory with three fine points of suture. The wound healed by first intention. In September, 1902, the whole region supplied by the facial nerve reacted to faradic currents. At present the peripheral regions supplied by the facial and the spinal accessory can only obey one impulse of the will. The mode of regeneration in this case is probably that the nerve branches from the axis cylinder of the central stump arrive at the peripheral end and then grow on into the old tubes of Schwann.

DR. JOBSON HORNE considered it would not be possible to overstate the practical importance of the points Professor Hartmann had dealt with in his paper. The technique of operations on the temporal bones, and a knowledge of the dangers of the operation, and how to avoid them, were not to be acquired by studying the measurements and the descriptions of the surgical anatomy given in the literature. For knowledge one had to go to the dead-house and to the laboratory, and although the minute dissection of the bone was laborious, and the time expended costly, it was the only path to a thorough knowledge of the region and of its remedial surgery. Ample evidence of this was afforded by the instructive preparations Professor Hartmann had brought with him, and had demonstrated to them. Speaking of the technique of the operation, Dr. Horne referred to the relationship of the posterior bony wall of the meatus to the facial nerve, and considered that more of this wall could be cut away than was generally done, and without injury to the facial nerve. This point had been demonstrated by Dr. Hugh Jones at a meeting of the Otological Society of the United Kingdom recently held in Liverpool. By a more efficient removal of this part of the bone better drainage was established, healing was accelerated, and the possibility of a subsequent narrowing or stenosis of the meatus was materially lessened. Another point to which Professor Hartmann had alluded, and which had given rise to considerable discussion in the Otological Society, was the advisability of leaving or removing the epithelium forming

the outermost layer or matrix of a cholesteatoma, and on this matter Dr. Horne was anxious to hear more fully the views of his former teacher. As regarded the interesting specimens shown by Mr. Elsworth to demonstrate an accessory antrum and a vein connected with it, Dr. Horne said that last year, after listening to the lucid description given by Mr. Elsworth at Manchester, he had formed the opinion that the vein referred to was a tributary to the petrosquamosal sinus, and that the accessory antrum was an aberrant mastoid cell. That opinion had been now confirmed by the opportunity he had had of examining the specimens; all of which were adult bones, and he inquired whether this accessory antrum was demonstrable in quite early life. Whilst fully agreeing that the vein might play an important part in the pathology of the bone, and that the possible existence of the cell should not be forgotten in the surgical treatment of suppurative disease, he thought it would be unwise to dignify either by special names, and thereby add to the terminology with which the bone was already burdened.

Dr. Tilley thought that if the multiplication of special instruments for many unimportant steps in the mastoid operation went much farther that operation would come to depend less upon surgical skill and knowledge of anatomy than upon the correct use of mechanical appliances. With reference to skin grafting after the radical operation he thought that all would be agreed that the method was only a time saving one as regards the after-treatment and that it should be, as a rule, reserved for cases in which the combined cavity was large. He had grafted 15 cases, but gave up the gold foil after the second one because it seemed to prevent escape of moisture and promoted maceration of the graft. Small pellets of aseptic gauze carefully and evenly packed down on to the graft gave excellent results. Separate grafts about the size of a sixpence or threepenny-piece were better than one large graft in that failure of one of these did not mean complete failure of the grafting operation as might be the case with one large graft. He thought that it was quite possible to get a small to medium-sized tympano-mastoid cavity to heal without any packing at all and had seen cases which had perfectly healed in five weeks when treated only by daily irrigation, and drying out with wool mops followed by the installation of spirit drops.

Dr. Bonner thought plugging the mastoid wound should not be continued for more than four or five days, as it only retarded healing. He would like to know the final result in cases where skin grafting had been used, say after a year or two.

Dr. Lodge described the formation of a shining resilient membrane in one of his cases two years after operation. He would like to know if other members had met with a similar condition.

Dr. Logan Turner said mastoid cases were generally spoken of as acute or chronic, but he would like to know what meaning exactly was attached to the terms. How long might a case be considered "acute" and treated as such, and when did it pass into the chronic category. With regard to packing, he thought that if we were going to give it up we should require to see our cases more frequently.

Dr. Woods thought that the multiplicity of instruments was to some extent the effect of want of early mechanical training on the part of the operator. As to skin grafting, he thought its function was a double one, first shortening the convalescence, and second, diminishing the tendency to subsequent stenosis of the cavity.

Professor Delsaux recorded his own experience and that of a colleague in dispensing with continuous plugging in the after-treatment. They removed the plug on the second day, and filled the cavity of the wound with boracic acid powder. At the end of a fortnight a granulating surface was found with islands of epithelium, which gradually spread and lined the whole cavity.

Dr. McBride felt extremely doubtful about the advisability of retaining the cholesteatoma membrane as advised by Dr. Grant and Professor Hartmann, seeing that it was the birth-place of the whole formation. The "accessory antrum," if constant, was a very important cavity, whatever name it might be called by. Stacke's protector was, in his opinion, an extremely useful instrument, and could not be efficiently replaced by a bent probe. With regard to the question of chronicity raised by Dr. Logan Turner, he thought a case might be considered chronic after a year, but the appearance of parts as seen through the aural speculum would generally enable a decision to be made. For instance, a small perforation, with pouting granulations, generally indicated a comparatively recent condition, with defective drainage, such as might probably be relieved by opening the antrum; in chronic cases there was often extensive destruction of the membrane, with loss of ossicles, etc.

Professor Hartmann agreed with Dr. Dundas Grant as to leaving the cholesteatoma membrane in suitable cases. He had noticed very rapid healing afterwards. He did not wash out in acute cases, and he laid great stress upon the dryness of the mastoid wound. He did not use Stacke's protector, nor did Stacke himself any longer.

THE LARYNGOLOGICAL SOCIETY OF LONDON.

Eighty-Fifth Ordinary Meeting, November 6th, 1903.

P. McBride, M.D., F.R.C.P.Ed., President, in the Chair.

(Continued from page 64.)

Sir Felix Semon: (DISCUSSION CONTINUED).

It remains for me to discuss a few points common to most intranasal operations in which active after-treatment comes into question, whilst it need hardly be said that after some operations, as, for instance, after removal of nasal polypi, no after-treatment whatever is required.

First and foremost the contingency of secondary hemorrhage wants some consideration. Opinions vary very considerably, as only recently shown in the discussion which followed the reading of Dr. Krebs' paper, as to whether prophylactic plugging is necessary and desirable in all such cases. Personally I entirely agree, as will have been seen from my preceding remarks, with Dr. Krebs, that firm plugging should, if possible, be altogether avoided, as it does not with certainty prevent secondary hemorrhage; as such hemorrhages may and often do occur when the tampon is removed on the day after the operation; as it may lead to infection of the adjacent parts; as the anæmia of the parts caused by the firm pressure is likely to interfere with the healing process; as it is anything but pleasant for the patient; and as I feel sure that the reactive swelling within the next few days after the removal of the tampon is greater than when this measure has been omitted. In operations, therefore, in which there is no particular reason to expect considerable secondary hemorrhage, I nowadays use no plugging at all, and only give the patient the boracic-acid-cocaine-adrenalin spray, the composition of which I have indicated previously. If the wound caused by the operation should be at all extensive, I introduce a loose strip of cyanide gauze, saturated in peroxide of hydrogen (1 to 20 volumes), into the operated nostril, not with a view of effecting compression, but merely with a view of preventing subsequent hemorrhage. [Krebs, instead of this, recommends the introduction of a small strip of gauze, or of a soft piece of absorbent cotton, saturated with adrenalin chloride (1 to 4000), which is to be retained for ten minutes only.] The patient ought of course to be directed to keep quiet, to rest on his return

home for a while quietly with his head slightly raised, not to blow his nose violently, and if in spite of all bleeding occurs, to apply cold water compresses over his nose. The simple advice, originally given by Hueter and resuscitated by Krebs, that the patient should, when hemorrhage occurs, inspire deeply with his mouth closed, and slightly expire with open mouth, will be found very useful in practice. It need, however, hardly be said that none of these measures affords an absolute guarantee against secondary hemorrhage; that in some cases, particularly after operations on the posterior ends of the lower turbinates, application of more powerful styptics or of energetic plugging by means of Bellocq's cannula may be found indispensable, and that even after the application of the latter on removal of the tampon fresh hemorrhage may occur. It will be very interesting to hear, in connection with this question of hemorrhage, the experiences of members of the Society, whether my own impression is shared by others, viz., that since it has become the universal practice to apply solutions of adrenalin chloride to the mucous membrane of the nose previous to intra-nasal operations, secondary hemorrhages have become more frequent, and somewhat more persistent than in previous times.

In the discussion which followed the reading of Dr. Krebs' paper in the German Otological Society on the points just mentioned, such different opinions as the following found expression:

Wolf (Frankfurt-am-Main) inquired whether after the application of adrenalin secondary hemorrhages were not more abundant.

Thies (Leipzig) spoke against the use of preparations of adrenalin for styptic purposes.

Schech (Munich) condemned as strongly as Krebs had done general meddlesomeness in after-treatment, but would not like to be deprived of twenty-four hours' plugging.

Siebenmann (Bale) warmly advocated the use of plugging in order to arrest hemorrhage, but advised to use wet tampons.

Zarnika (Hamburg) agreed with the opener of the discussion in all essential points, and stated that in the course of the last ten years he had only twice found it necessary to plug; he also strongly recommended that patients about to undergo intra-nasal operations should abstain from the use of alcohol for several days previously.

Werner (Mannheim) considered short plugging required.

Körner (Rostock) thought one may do without plugging, but ought not to perform these operations in the out-patients' room.

Kronenberg (Solingen) emphasized the importance of after-treatment, and considers adrenalin very useful in operations in the upper parts of the nose.

Krebs himself, in summing up the discussion, referred to Bukofzer's experiences, from which he concluded that the fears as to more frequent and greater hemorrhage after its use were unfounded. He himself laid more stress upon deep inspiration through the operated half of the nose than upon adrenalin applications. He had given up plugging for the reasons stated in his paper, already previously to the introduction of adrenalin.

From all this it is obvious that anything but unanimity prevails with regard to the use of adrenalin previous to, and the use of plugging after the operation.

As regards other general principles, we all, I think, will be agreed that meddlesomeness should be deprecated. Unfortunately, however, as I have tried to show, it is not always easy to say where meddlesomeness ends and neglect begins. If adhesions should, after all, unfortunately form, because one does not wish to disturb the normal course of healing, the operator is practically certain to be accused of neglect, and if he wishes to escape that Scylla, and sees his patient daily until all risk of the formation of adhesions is practically over, he is apt to fall into the Charybdis of being accused of making a big thing out of a small operation. I can quite understand the patient's feelings in this matter, and I must confess that it seems to me an opprobrium to our branch that at a time when the biggest operations in other parts of the body are performed in one sitting, the period of after-treatment being of the briefest, it should be looked upon, to conclude from the writings of various rhinological authorities, as a self-understood matter, that the after-treatment of these simple operations should occupy a period of many weeks! What Krebs states about the principles to be followed in cases of *normal* healing of the wound will probably be endorsed by most specialists. He says, "The normally healing nasal wound is not to be considered as an object of treatment at all. The patient, who, as a rule, feels very little trouble after the operation itself, ought to be told that, as he has a wound in his nose, he should abstain from alcohol, and that he ought to avoid diving and swimming, as well as violent sniffing up, in order not to get pus through the tube into the middle ear. The nasal cavity itself, however, ought to be left alone. It is one of the most valid principles of surgery not to disturb wounds in their regular course, not even to probe them. Yet, how much is sinned against this direction in the nose! One sees that the patient is told to come, after, for instance, removal of parts of the lower turbinated bone, every day or every second day, when, with pain and difficulty, scabs are loosened with the probe and removed with the forceps; one sees washing out,

touching, cauterizing of granulations, burning, insufflations, etc. All this is usually superfluous, sometimes even disadvantageous to the healing of the wound. All that is necessary is to control whether the wound heals normally, particularly whether adhesions are forming, and whether the complaints of the patient have been removed by the by means of cocaine or adrenalin. The cicatricial bands, which have it will be sufficient if the patient is seen once more, say after a fortnight. In other cases a somewhat more frequent control will be desirable. No universal formula can be given; I believe, however, in cases when the wound heals normally it will almost always be sufficient to examine the patient again on the first, seventh, fourteenth, and twenty-eighth day after operation. On these occasions one may remove dried crusts if they should be disagreeable. One may cauterize luxuriant granulations with solid nitrate of silver, and one may insufflate antiseptic powders,—for instance, xeroform. That regular insufflation of disinfectant powders promotes the healing of the wound I have not been able to convice myself after long trials made with iodoform, aristol, airol, dermatol, xeroform, and menthol and boracic acid. When wounds have been made by means of the galvano-cautery, and in others in which much secretion takes place, it may be required to apply to the introitus of the nose a mild ointment, such as menthol-vaseline (1 to 100), in order to prevent eczema. If there is a risk of the formation of adhesions a more active after-treatment is required. The patient should be seen daily or every operation. In many operations, particularly by means of the snare, second day. The nostril which is in danger is to be opened *pro tem.* already formed, ought to be divided by cutting instruments (not by means of the probe, because through this more slowly healing wounds are produced), and a little piece of gutta-percha paper, disinfected by sublimate and subsequently rinsed in a salt solution, should be introduced into the nose. If the patient does not blow his nose such a strip will be retained for hours or even days in the same place. Some authors recommend an orthopædic after-treatment after operations for deviation of the septum. This after-treatment is superfluous when the deviated parts of the skeleton of the nose have been thoroughly removed; if this has not been done they usually result in failure."

So far Dr. Krebs. Whilst I entirely agree with him that in cases of normal healing of the wound, meddlesomeness is to be strongly deprecated, and whilst I find all the directions he gives with regard to this point admirable, I confess to my regret that in my experience the number of cases in which the wound does *not* heal normally is

greater than one should expect from the brevity of his remarks on that point, and that I find neither in his paper, nor in the discussion which followed it, a panacea for the prevention of, or really effective dealing with such difficulties as those which have induced me to propose this subject for discussion in our Society. I devoutly hope that in our discussion we shall hear of some method or methods through the adoption of which we may generally obtain in all cases effective curtailment of our after-treatment, and in many cases even better results from the operations than those realized by our present methods.

Dr. Scanes Spicer said that what chiefly struck him in the introductory paper, as well as in Mr. Butlin's letter, was the recognition of the very real difficulties, complications, and duration of the surgical treatment of nasal obstruction—conditions which removed nasal surgery from the category of minor surgery. This was a conclusion which the so-called advanced rhinologists had contended for years ago. He knew of no class of surgical cases which demanded more tact, judgment, and skill than the management of nasal cases and their conduct to a satisfactory termination, with a minimum amount of after-treatment (*i. e.*, an indefinite multiplication of operations).

The significance of what he had to say lay in its application to the diminution and simplification of the so-called after-treatment of nasal operations, and the obtaining of the maximum amount of benefit possible in the minimum of time, rather than in the discussion of minor details.

His first point was that it was not wise to confine one's attention merely to the chiefly objective abnormality (*e. g.*, spur, deflected septum, or moriform) and to operate on that, but to regard all the conditions in the individual case contributing to the obstruction, to consider the proportions in which they did so, and to adopt a policy reasonably calculated to restore a permanently efficient, normal passage, and ensure a speedy recovery with a minimum of after-manipulation. He thought he must have encountered an unusually high proportion of complex and difficult cases, but he could affirm that of late years his cases were comparatively few in which the obstruction could be effectively dealt with casually in the consulting room with cocaine. To take an imaginary case, one might have in an obstruction case to consider spurs, bony deflections, cartilaginous dislocations, various enlargements of middle and inferior turbinated bodies, adenoids, and anterior nasal stenosis as all factors in the existing obstruction. One cannot envy the lot of the patient who has to give up months or years to the removal of such a combination by a suc-

cession of operations, or wonder if he became neurotic to the degree of insanity, and wanders round from one specialist to another. He would therefore recommend, firstly, a complete diagnosis of, and secondly, a well-planned and boldly-executed operation on, the various factors actually making the obstruction, as the best preventive of unduly protracted after-treatment.

This led to his second point, that in these cases he considered it advisable to give a general anæsthetic in order to permit such a combination to be dealt with at one coup. Sir Felix Semon seemed rather to prefer local anæsthesia as giving a better view of the field of operation in the nose, but he could assure the Society that he had done all his private obstruction operations for several years in the rhinological position, with as perfect a view as it was possible to have, and with the additional advantage of the patient's head being without difficulty maintained in the most convenient posture for just as long as was necessary. This, of course, necessitated the patient being in a nursing home, and he had found that very seldom in the last few years had his obstruction cases required to be in the home more than ten to eleven days, and were then usually sufficiently convalescent to pass out of the surgeon's hands. He had had more success since he had used Lake's rubber splints and similar sheets of soft rubber, which permitted of gentle irrigation and some ventilation of the operated nasal cavity, without causing the irritation and hemorrhage which so often attended the removal and changing of the gauze-packings he had previously used.

He was very far from asserting that every case was cured of everything for ever and ever by this method, but there was no comparison between his results now and seventeen years ago, when he commenced dealing with these cases by piecemeal operations. Obstruction cases were now almost invariably successful if the patient would only tolerate a brief period of confinement and after-treatment, and a second operation for obstruction after the fortnight was most rare.

His third point was with reference to a condition which led to a repetition of operation, and which he did not think was as yet recognized as a cause of prolonged after-treatment, and that was a condition of anterior stenosis due to alar collapse and alar rigidity, the result of which was necessarily on common physical principles to lead to a condition of rarefaction of the air in the nasal chambers on inspiration through the nose. This diminution of air-pressure on the walls led to vascular turgescence and œdema, and it was not difficult to conceive that the removal of extra-vascular pressure from the constituent walls of the newly forming blood-vessels, combined with the

positive force of capillary blood-pressure, led to the heaping-up of new cells, granulation masses, and thickenings, of which Sir Felix Semon had spoken.

As a practical outcome of these views he had for years aimed at restoring the physiological action of the muscles of the alæ nasi in respiration, and in most cases of complex nasal obstruction in which the alæ were collapsed or rigid or sunk-in unduly on inspiration,he dilated with a screw dilator, to the fullest extent, the fibrous tissue of the alæ, taking care not to tear it. As a result of this it was frequently seen that the normal expansile action of the alæ at once commenced, the air entered the nose normally, the walls were subjected to normal variations of atmospheric pressure, instead of the relatively great suction which was experienced when there was alar stenosis. He believed the explanation to be that the muscles of the alæ, paretic from disuse, were unable to respond to the inspiratory impulse when the resistance offered by the rigid alæ was diminished. Subsequently he inserted smooth rubber rings in the vestibule with the idea of maintaining the mechanical dilatation, while the alar muscles regained their power and co-ordinated action with the other muscles of inspiration. These rings were inserted in front of Lake's splints.

Dr. St. Clair Thomson said, that as they were all given to err, it was pleasant to find that they erred sometimes in good company, and that their leaders followed the same mistaken footsteps that they themselves had trod. To put it concisely, the best way of avoiding the difficulties of after-treatment was to have a strict regard for the natural processes of repair, and to take the utmost precautions before operating with regard to the preparation of the patient, the surgeon and the instruments. Unfortunately—or perhaps fortunately—they could not improve upon the natural processes of repair, and, in regard to the nose, certain points had to be borne in mind in addition to those in other parts of the body, namely, the great excretion of moisture from the surface of the nose, the work of the ciliated epithelium, and the secretion of mucus. Bearing this in mind, it would be seen that it was of the highest importance to avoid, if possible, any after-treatment, and particularly the use of powders and plugs. They had to remember that fresh blood was itself a germicide. Lister used to be fond of pointing to the "organized blood-clot" in his wounds. This blood-clot could be seen on the anterior end of the middle turbinal after amputation, and was frequently seen on the roof of the naso-pharynx after the adenoid operation. He had only noticed this in private practice, as hospital patients were so uncleanly in themselves and their surroundings. He believed he was right in

saying that Sir Felix Semon himself used no after-treatment for the adenoid operation, and most of them would agree with this. He himself had tried to introduce it at a hospital where the sanitary arrangements were not perfect, but the nurses had begged him to have the children's noses washed out at least once after the operation, as the smell was too foul for them to put up with; yet the operation itself was carried out as in private. As strict antiseptic measures in the nasal chambers were impossible, half-measures were irritating and useless. The attempt to make antiseptic lotions or powders in the nose have any germicidal action was futile; they might neutralize the toxines, but that was all, for the Schneiderian membrane would tolerate no active bactericide. Personally, he so seldom used the galvano-cautery nowadays, that his experience of the after-reaction was comparatively small. He believed more in the use of cold steel in the form of knives, scissors, punch forceps, or wire snare. Asch's operation he had performed only a few times and in selected cases, but with good results. He confirmed the use of Lake's soft rubber splints as being vastly superior to the hard vulcanite tubes introduced by Mayer in America. He could give some personal experience of the operation on the septum which had been mentioned. He had himself seen a patient under local anæsthesia have the septum resected and sit perfectly still for one and a quarter hours. This was in Germany. He did not think it would be done in this country. He was anxious to see if he could do the same operation under a general anæsthetic, but his experience was not yet sufficiently extensive to entitle him to refer to it before the Society. This method of submucous reaction was, in his opinion, the most promising of septum operations. He could not altogether agree with Dr. Spicer as to the necessity of doing one large operation on the nose; he thought, with Lermoyez, that nasal operations should be done "in fractions." If surgical interference was limited to one side at a time, the reaction was much less than if both sides were attempted at one sitting.

Mr. Cresswell Baber said that the chief practical point to consider was the after-treatment of ordinary cases of operation for nasal obstruction in which portions of the septum or turbinated bones had been removed, or the galvanic cautery had been applied. From some years' experience he was convinced that the less done to the nose after operation the better. The plan he adopted in these cases was to do nothing to the nose whatever except placing a light plug of antiseptic wool, dusted on the first occasion with iodoform, into the vestibule. This was frequently changed. After a week he examined the nose, applying cocaine, and removed any slough with forceps,

and if there were any chance of adhesions he passed a fine probe through the cavity. This he repeated once a week if there was any liklihood of adhesions, or he instructed the patient to pass for himself a thin bone spatula, about nine-sixteenths of an inch in width, right through the nasal cavity, and let him do it two or three times a week. He had used these spatula for the last seven years in a good many cases, and found them very satisfactory for preventing adhesions. He thought in only two circumstances was it necessary to leave a foreign body in the nasal cavity after operation: (1) in excessive hemorrhage, which was very rare in his experience; (2) in cases in which a deflected septum had been divided and pushed into a more normal position, a tube or other apparatus might be necessary to keep it in place. As regards washing out the nose, he did not do this until some weeks afterwards if there was much discharge. Granulations might be touched with silver nitrate. He found that, in sawing off a ridge from the bony septum, in order to get a satisfactory result it was generally necessary to remove the small inferior turbinated body on the deflected side at the same time. A very important point had been raised by Dr. Spicer, and that was to examine very carefully the state of the vestibule before doing any operation in the nasal cavity for obstruction, so that disappointment might not ensue. Sir Felix Semon had expressed his astonishment that a septum should sometimes take five weeks to heal. In his (the speaker's) experience it generally took that time or more, and one had to watch the case until it was quite healed. As regards anæsthetics, he thought general anæsthesia was necessary in a good many cases, and it gave good results. One could see exactly what one was doing by having the head slightly raised and working with the aid of a reflector.

Dr. Bronner referred to the question raised by Sir Felix Semon as to the application of cocaine. He formerly used a spray, but now he employed powdered cocaine, eucaine, and desiccated supra-renal extract, and applied it on wet cotton wound round a probe; in this way he was able to localize much better. He was a great advocate of the galvano-cautery, and used it nearly every day of the week, and he had had very few bad results. He used a cautery with a very thick, broad point, and burnt away the tissue to the extent he considered necessary. He regarded as a most unsurgical procedure the method of sticking a thin point into the mucous membrane, as this often set up severe inflammation of the turbinal. As regards the after-treatment, he prescribed a 4 per cent solution of bicarbonate of soda, and told the patient to syringe the nose frequently. This re-

lieved the pain and prevented the formation of crusts and sloughing. Should there be sloughing, he removed the crusts and applied trichloracetic acid. He always used a trephine for removing spurs. He did not consider it remarkable to get a swelling of the cartilage after trephining; as in all other parts of the body, any operation on cartilage was followed by local thickening, which lasted for some weeks. With reference to the septal operation, he generally did that suggested by Moure, and he found it fairly successful. He generally used a general anæsthetic. He had tried the wonderful operations which had been described, and found them exceedingly difficult, requiring a lot of time, and the patients would not have them. In spite of what had been said, he thought that it was dangerous to give an anæsthetic when the patient was in a sitting position. As regards hemorrhage, he always applied powdered ferropyrine, and he had never had a serious hemorrhage, except in one case, where the patient told him after the operation that he was a "bleeder." He always told the patient to syringe with very hot water if there was any hemorrhage. He never used a plug, but put in a small piece of cotton wool, to be changed every fifteen minutes. He gave most of his patients an antiseptic mouth-wash, and in his district, where he had the poorest to treat, he found it necessary to lay emphasis on the importance of having a clean mouth, as a septic mouth very readily gave rise to suppuration in nasal operations. He found that it was better for the patients to come frequently and have a little done at a time than to have the total causes of obstruction removed at one sitting by a big and long operation under a general anæsthetic. There was always a certain amount of danger in a big operation, and many fatal cases had occurred. In Moure's operation for deviation of the septum, of course, a general anæsthetic was necessary; but when the nasal obstruction was due to other causes a general anæsthetic was unnecessary, dangerous, and uncalled for, except if the patient was very nervous. He had seen many cases, some with emphysematous chests, weak hearts, and who had been advised to undergo an expensive operation, and whom he had cured in a few sittings with a local anæsthetic.

Mr. Waggett thought that in the hands of a skilled anæsthetist nothing was better than a general anæsthetic with the patient sitting up. On the other hand, local anæsthesia made it possible to divide an operation into separate stages, which was often desirable. The discomfort and inflammatory reaction sometimes following galvanocauterization were much reduced if the parts were swabbed with glycerine and carbolic acid. As regards adrenalin, he agreed with

Sir Felix Semon that it increased post-operative reaction in most cases, and that its use induced a tendency to hemorrhage. He was, however, bound to say that, although he often used adrenalin, he had not seen any troublesome hemorrhage for some considerable time, ever since he had adopted the routine use of peroxide of hydrogen after all cutting operations of any magnitude in the nose. His practice was to have a mixture of the peroxide (vols. 10) with an equal quantity of tepid water pumped into the nose every three hours during the first two days after operation. Not only did this prevent hemorrhage and keep the nose clear of blood-clots, but where it was desired to keep a splint in the nose for several days or where a gauze packing had been employed, these could be retained in the nose without fear of sepsis. He generally used a cocaine nasal spray for the purpose, passing the small terminal of the instrument two inches or more into the nose above and below the splint, or into the interstices of the packing. As to the permanent thickening mentioned by Sir Felix Semon as occurring after some operations on the septum, he believed its degree was more or less proportional to the length of time taken in healing. After the removal of a spur by the electric trephine or the saw the wound should not be retarded in its healing by the ischæmia which resulted from tight plugging, nor irritated by loose plugging. Moure's operation for the deflected septum had this advantage, that the cuts were placed above and below the part which needed to be pressed upon by the splint. He was in the habit of using Lake's splint after this operation.

Mr. Hunter Tod testified to the excellence of the Krieg-Bønninghaus operation. During the last two years he had adopted this method in the treatment of cases of nasal obstruction due to deviation of the septum, and had operated on some thirty to forty cases. His chief reason for preferring this operation to any other was the simplicity of the after-treatment. Intra-nasal splints were not required, and continual daily dressings were avoided. Plugging the nose with gauze during the first twenty-four hours after the operation to prevent hemorrhage, and the daily employment, for three weeks, of a simple nose wash followed by the use of an oily spray, to prevent the formation of crusts, was all that was required. He (Mr. Tod) advocated the use of a general anæsthetic, the patient being in the usual recumbent position. The nose should be plugged, just before the anæsthetic was administered, with gauze soaked in a freshly-prepared 5 per cent solution of cocaine and supra-renal extract in order to prevent hemorrhage during the operation. The only difficulty in the operation was the avoidance of an accidental perforation

of the septum. He incised the mucous membrane as far forward as possible, on the side of the obstruction, and then cut through the cartilage carefully, separating it with a probe from the mucous membrane of the opposite side. As much of the cartilage, and even of the vomer and plate of the ethmoid, as was necessary was now removed by means of a special punch forceps which Mayer and Meltzer had made for him. The mucous membrane on the side of the obstruction was removed with the cartilage, and only a single layer of mucous membrane left to represent the septum. This gradually stiffened, and afterwards formed a straight septum. The wound healed within a month. The result was usually very satisfactory. It was sometimes necessary to remove, on the non-obstructed side, the anterior ends of the middle and even of the inferior turbinates, if their mucous membrane was hypertrophied, to prevent obstruction on this side, owing to the straightening of the septum. He (Mr. Tod) agreed with Sir Felix Semon that the use of supra-renal extract increased the liability to hemorrhage, usually beginning two or three hours after the operation, and for this reason he always plugged the nose for twenty-four hours after the operation.

Dr. Herbert Tilley thought that all rhinologists in this country would agree that in the great majority of cases where an intra-nasal operation was performed for the removal of a septal spur or crest or for the correction of a deviated septum a general anæsthetic was advisable. The additional risk was slight, and was more than counterbalanced by the fact that the surgeon need not regard the feelings of his patient, and by a careful arrangement of pillows he could have the patient's head in any convenient position that he might desire. He thought the galvano-cautery had lost favor for two reasons:—(1) Its effect was not permanent. A patient might obtain relief from nasal obstruction lasting for many months, but generally the condition returned again, and further intervention was necessary. In a bad case of hypertrophic rhinitis the removal of the anterior fourth of the inferior turbinal body gave great and permanent relief, and the time involved in treatment was less. The operation could easily be done under "gas" anæsthesia. The inflammatory reaction referred to by Sir Felix Semon was, the speaker thought, much minimized if some glycerine and carbolic acid, or even pure carbolic acid, were applied to the eschar immediately after the application of the cautery. It further acted as an antiseptic and local anæsthetic. He confessed some surprise at the frequency with which Sir Felix Semon had met with adhesions following the use of the galvano-cautery or intra-nasal operations. Of course it might be replied that a surgeon might

fail to see many such cases because his failures passed into the hands of other rhinologists. That might be true, but even then we should all occasionally meet with the failures of others; but the speaker could only recall two cases of adhesions (giving rise to symptoms of obstruction) which had come under his notice during the past year, and in both these instances the cautery had been used by unpracticed hands. He thought that an adhesion, whether it occurred after the use of the galvano-cautery or a cutting operation, indicated that the surgeon had wounded the opposing areas. In the removal of a septal spur it was a very easy thing to abrade the mucous mebrane of the opposite turbinal body, and this unconsciously; and an adhesion would almost certainly result if a suitable plug were not inserted, or, better still, a little more than necessary of the obstruction should be removed in order to ensure a wider interval between the wounded parts. He thought a flat saw was less calculated to injure neighboring parts than the circle of a trephine, which must necessarily occupy much more room in the nose. Normal mucous membrane would never unite with a granulating surface. In the case of the cautery point, if it be impossible to burn the redundant tissue of the turbinal without scorching the neighboring mucous membrane of the septum, it is highly probable that cauterization would be of no permanent value in so narrow a nose, and therefore an anterior turbinectomy should be carried out. He agreed with those who had found adrenalin predispose to a freer secondary hemorrhage. His own plan was to apply a 10 per cent solution of cocaine to the parts to be removed, say five minutes before the general anæsthetic was administered. Having removed the obstruction, bleeding in ordinary amount was not checked, and he rarely inserted any plug at all. If it were necessary, however, he used strips of ribbon gauze and left them *in situ* for forty-eight hours; if removed before this, the hemorrhage was often as free as in the first instance. The liquor opii sedativas was often a valuable drug for quieting the circulation in nervous patients where constant oozing of blood from the nose was a source of anxiety. With regard to the overgrowth of new tissue upon the site of a former obstruction the speaker thought that this would become less of a bugbear if it were made a golden rule in operating for nasal obstruction (especially septal outgrowth) always to remove a good deal more than seemed necessary at the time of operation. He had never regretted removing too much, but often that he had been content at the time of operation to ensure free respiration. Far better make a perforation through the septum than that removal of the obstruction should be followed by that excessive

growth of formative tissue so well described by the introducer of the discussion. In cases of deviated septum Asch's operation had given him excellent results. To keep the parts in position he always used Lake's splints, removing them every day for the purpose of irrigating the nasal cavities with a warm saline lotion. In this, as in nearly all intra-nasal and sinus operations, oxygenated water was an excellent styptic and cleansing agent.

Dr. Watson Williams, alluding to the question raised by Dr. Tilley as to the use of the galvano-cautery, said that when one had a case of nasal stenosis one looked to see whether the stenosis, great or small, was due to something which could be readily removed by a minor procedure, or whether its removal required a rather complicated operation. Some of the most marked cases of stenosis were those which could be most easily removed; where the galvano-cautery was employed for the middle and inferior turbinates there was a possible danger in the formation of adhesions which gave considerable trouble in the after-treatment. To prevent such accidents he had had a speculum made with long ivory blades which were adjustable so that either blade could be made an inch to an inch and a half longer than the other. This enabled one when putting in the speculum on either side to expose the turbinate body for the application of the cautery, whilst the septum was protected. Since using this instrument he had found it a great convenience, as it avoided a good deal of the after-trouble, which was formerly so frequent, inasmuch as the burning of the mucosa which arose was sometimes due not to actual touching of the opposite side, but to the scorching from the proximity of the cauterizing point by reflected heat. There was always a difficulty in preventing adhesions when two raw surfaces occurred in such close proximity. With the more extensive operations he had been at a loss sometimes whether or not he should plug. If one used a plug one had to remove it soon, for, in spite of all antiseptic precautions, it became exceedingly foul in twenty-four to forty-eight hours, and the changing of plugs was always liable to set up fresh hemorrhage. On the other hand, if one did not plug one was liable to be summoned at any moment in consequence of severe secondary hemorrhage. As far as his experience went he was bound to say that the tendency to hemorrhage was increased by the use of adrenalin. Personally, he had found nothing so useful for the prevention of hemorrhage as peroxide of hydrogen, which he generally used in the after-treatment of these cases. It was also most useful in the removal of plugs, because it loosened the blood clots, and enabled one to remove the plugs by gentle means, whereas if force were used the hemorrhage which one so desired to avoid was almost sure to occur. He considered the

operation for deviated septa described by Mr. Tod eminently satisfactory in suitable cases; but it was more desirable that if this operation was to be done the septum should not be previously cauterized or submitted to other methods of treatment which might render the perichondrium more than normally adherent to the underlying cartilage.

DR. DUNDAS GRANT said that intra-nasal surgery was full of surprises. In cases which seemed most unfavorable the results were often unexpectedly brilliant, but it occasionally happened that in the most straightforward-looking ones the local or general disturbance was most serious. Intra-nasal operations were a source of constant anxiety. He was in accord with the view expressed by Brieger at the Florence Congress, namely, that as much as possible of the mucous membrane should be left to exercise its microbicidal action, and therefore as little as possible should be done at a time. He was much gratified to find Sir Felix Semon and Prof. Chiari in favor of the anterior inferior turbinectomy which he had advocated in his introduction to the discussion on the Uses of Turbinotomy as applied to the Inferior Turbinated Body (May 12th, 1897), and which he frequently practised in preference to operating on the septum. The anxiety attending nasal operations depended upon the possibilities of hemorrhage, local or general sepsis, the formation of adhesions, insufficient result from removal of too little tissue or persistent crust formation and dry pharynx from the removal of two much. Lastly the occurrence of coincidental disease, contagious or otherwise. In regard to hemorrhage, he avoided plugging if by any means possible. At the most he applied the end of a strip of gauze to the raw surface until the patient reached home. By preference he did even minor intra-nasal operations in a nursing home, or sent the patient to one immediately from his consulting-room for one or two nights. The gauze was there removed at once, any bleeding being allowed to take place over a basin while the patient breathed vigorously in and out through his nares. He only reapplied the gauze if the hemorrhage was very excessive. The avoidance of plugging was the first step towards the prevention of sepsis, but the observance of the rules of aseptic surgery as relating to the sterilization of hands and instruments, cotton wool, cocaine solutions, etc., was of course of the greatest importance.

In galvano-cauterization of the inferior turbinated body he thought he had been fortunate in avoiding the formation of adhesions by practising this exactly in the manner he had described at Ipswich. He applied cocaine on a pledget of non-absorbent wool, leaving it *in situ* for about fifteen minutes, then carefully swabbed away all moisture

by means of absorbent wool, so as to avoid scalding the opposing surfaces. He next introduced the galvano-cautery point under the mucous membrane as deep as the periosteum and withdrew it while still at a red heat. This submucous galvano-caustic puncture could be repeated, if required, at several spots. The punctured spots were then painted with deliquescent trichloracetic acid (which appeared to produce an antiseptic seal); the whole turbinated body was then brushed with a 10 or 15 per cent solution of antipyrin (which kept it in a state of contraction for several hours), and lastly a little aristol or europhen was insufflated ,as calculated to help in forming an antiseptic scab and a barrier between the opposing surfaces which it seems quite gratuitous to dispense with). The patient was ordered, as a rule, a few doses of bromide of potassium, with a little salicylate of sodium as a calmative comparable to the sedative solution of opium already referred to, and devoid of certain of its objections. On two occasions his anxiety to insure a sufficient result as quickly as possible had led him to practice this submucous cauterization with exceptional thoroughness, and the exfoliation of a thin sequestrum from the surface of the inferior turbinated body had resulted. He now considered it necessary to exercise great discretion. He had, like Sir Felix Semon, seen adhesions in cases in which operations had been performed by other practitioners, but he had also seen them present in several cases in which no operation of any kind whatever had been performed. In some patients the nasal mucous membrane was abnormally sensitive, and he had seen a case in which very alarming nervous disturbance appeared to have been occasioned by a simple though thorough examination of the nasal cavity by means of a long-bladed speculum. The disturbance seemed analogous to that occasionally produced by the passage of a urethral bougie. In the particular instance the examination was, however, followed by a railway journey and a good deal of social exertion. The question of how much to remove in any given case was often a difficult one, but especially in cases of deflection of the anterior part of the cartilaginous septum with concomitant thickening. It was most undesirable to produce a perforation, and it was better to err in the direction of removing too little. This could be easily corrected, but a perforation could not be closed. It was undoubted, however, that in many cases of perforation there was little or no resulting discomfort, and the restoration of nasal patency afforded great relief. He did not advocate complete turbinectomy if other measures were sufficient, but in some narrow noses the results were most brilliant, and the discomfort, if any, from crusts, of short duration. The subjects of nasal operation were very liable to accidental infections, such as those of

scarlet fever and influenza. These usually manifested themselves with abnormal rapidity, probably not later than forty-eight hours after the operation. This was the period of anxiety. He practiced and advocated Moure's operation for deflection of the cartilaginous septum. He had used Moure's hollow metallic splint, and also the straightening transfixion needle, but the strong recommendation he had heard of Lake's india-rubber splint was irresistible. In general, he advocated the removal of as little nasal tissue at a time as was compatible with the restoration of reasonable patency, the avoidance of traveling or exertion after operation, the reduction of nasal tamponing to a minimum, and as far as possible the avoidance of exposure to infectious disorders.

DR. PEGLER said the objects he had in view in nasal operations and their after-treatment were the prevention of hemorrhage, primary and secondary; the avoidance of septic infection and consequent abscess of the septum, septic tonsillitis, or aural inflammation, the absence of adhesion formation, and the establishment and maintenance of an efficient air-passage. If secondary hemorrhage were, as usually stated, due to sepsis in the wound, it followed that keeping the latter as aseptic as possible would be a good prophylaxis against it, and this he had found to be the case in practice. As regarded primary hemorrhage, he had been fairly satisfied with the bloodless method as carried out by the use of some one of the adrenalin solutions. Not having had secondary hemorrhage after its employment so far, his experience scarcely accorded with that of previous speakers. He had had more hemorrhage in his early work than in his later, and attributed this to improved methods of operating, especial precautions being taken against leaving untidy surfaces on the septum or turbinals, or shreds of mucous membrane. He made very free use of iodoform insufflation, and avoided packing, at any rate for more than a few hours after operating, but of course there were circumstances in which a gauze plug must be employed, and it might require to remain for twelve hours or more. In very many cases the india-rubber splint served the purpose of both plug and splint, which was a great recommendation, and provided the splint was not too thick, and was suitably shaped, he had never had occasion to complain of ill effects from anæmia of adjacent parts. It was tensive pain that he dreaded, and not anæmia of the tissues, for the copious mucus that was invariably poured round and about the splint protected them. Hence healing went on freely in presence of a well-adapted splint, and the pressure effects upon shreds and unevennesses in the operated parts was a distinct advantage. The speaker said he had entered so fully into the subject of Lake's turbinal operation and

india-rubber splints in his Ipswich paper that it was unnecessary for him to go over the ground again at the present discussion, but he was pleased so many authorities were now adopting these methods. Anterior turbinotomy had largely superseded the galvano-cautery in his hands, save only in roomy passages rendered slightly insufficient by erectile tumefaction; in tight chambers, and where there was bony enlargement of the turbinals, the cautery should be rigorously excluded. The explanation of adventitious tissue formation after cauterizing by scorching, owing to the close proximity of the walls, was an excellent one, and this evil consequence should be sufficient to deter the operator from employing the cautery in such cases. The speaker fully concurred with Sir Felix Semon in his valuable remarks on the mucous turgescence, and apparent change for the worse in regard to space, after recent operation, say upon the septum in a narrow fossa. For his own part, when he found this condition about to supervene he did not hesitate to sacrifice whatever might be needed of the inferior turbinal, and perhaps the middle, till the "right of way" was sufficient for good drainage, general safety, and comfortable respiration. It was sometimes convenient or unavoidable to allow the adhesions to form, and remove these and whatever was necessary of the adjacent wall at the same time or on some subsequent occasion, taking care to prevent re-formation by judicious use of the splint. A system of *sawing out*, when a septal outgrowth had to be got rid of, instead of merely cutting on the flat, was a great help in securing against subsequent trouble. Dr. Pegler said he would like to have heard more from Sir Felix Semon anent the work and writings of British rhinologists than he had done, but an operation that had come to us from Bordeaux and was of extreme value had had no mention except by subsequent speakers. He alluded to Moure's operation for deflection of the septum, and was much gratified to find his own endeavors to popularize this method had met with response. He trusted he might take some credit for these results and he should welcome suggestions from other rhinologists for still further improvements in these often difficult cases. Subsequent experience confirmed his belief that Lake's india rubber was the best form of splint after doing a "Moure," and he was glad the simple cutting pliers (septotome) he had devised were finding favor, but he should recommend the instrument makers to no longer render the blades detachable, as the advantage of this was not at all apparent. We were probably all in agreement with Sir Felix that true regeneration of the inferior turbinal after removal was quite impossible, and that soft cushions of mucous membrane projecting from the septum, in fact from either wall (including the inferior turbinal),

required much patience in treatment. This was not the case, however, with lymphoid excrescences, which he had found much less liable to recurrence. Only that morning he had seen a patient from whom two large pedunculated lymphoid masses had been removed from the posterior extremity of the vomer seven years ago, and he was glad to see that only the merest traces, a gelatinous-looking thickening, on either side now remained. Dr. Pegler said he would conclude by calling attention to a hemorrhagic ulceration which rarely supervened a considerable time after operation upon inferior turbinals that had been affected by œdematous and hypertrophic conditions. He had described such a case which had given rise to much difficulty, but ultimately yielded to iodine in Mandl's solution of the strength of one drachm of pure iodine to the ounce, locally applied.

Dr. Donelan thought that synechiæ could be certainly avoided only by insuring adequate separation at the time of operation either by the removal of sufficient tissue, the use of suitable splints, or by both. Measures taken at a later period to avoid threatening adhesions were usually unsatisfactory in their results. A further advantage of Lake's splint was its somewhat absorbent surface. It could be sterilized and then impregnated with medicaments calculated to hasten healing. The trouble so often arising after septal operations were very often due to an endeavor to force the anatomical peculiarities of the patient to adapt themselves to some Procrustean procedure. This was not the occasion to enter upon a discussion of the merits of various septal operations, but, though those mentioned in the course of the debate were all excellent, in certain cases there were many examples of deformity, as, for instance, where the extreme convexity formed, as it were, a basal angle of a pyramid near the floor of the nose, in which specially devised measures would alone be successful. The success of the after-treatment of these operations must always depend not only on the manipulative skill of the operator, but in the judgment and mechanical ingenuity with which he devises modes of attack suitable to individual peculiarities.

Dr. Furniss Potter said that he had had a not inconsiderable experience in the use of adrenalin, but had not encountered any trouble from hemorrhage following its application. He admitted that he had been in the habit of plugging with gauze, and usually removed the plug in from six to twenty-four hours. If an hour (or half an hour) previous to removal the gauze were thoroughly moistened with a spray of hydrogen peroxide, and then carefully withdrawn, bleeding would be avoided. With reference to anæsthesia, from his own experience he found it more satisfactory in a great

number of cases to operate with the patient sitting in a chair and with the aid of cocaine. He had seen a number of operations under general anæstehsia, the patient being in a sitting position; ether could not be conveniently administered after the commencement of the operation, and continuance of the anæsthesia with chloroform in the upright position, in his opinion, was by no means devoid of anxiety. He certainly thought that such operations as removal of septal spurs and inferior turbinectomies (which formed a large proportion of the operations under discussion) could be performed most satisfactorily without a general anæsthetic, except in the case of extremely nervous, excitable persons.

Dr. William Hill felicitated Sir Felix Semon on being more in sympathy with earnest rhinologists than on recent occasions when he had made "some observations" on nasal surgery. The opener of the discussion had referred to an instructive case, which he (the speaker) had many years ago brought before the Society, and spoke of it as one of "Regeneration of the Turbinated *Bone*." Now that was certainly a misquotation of title, and doubtless due to quoting from memory. He could not remember at the moment the exact words used, whether "turbinal body" or "turbinal tissue," but he had just consulted his neighbor, who, like himself, had had similar cases, and was familiar with the literature on the subject, and Dr. Tilley had informed him that the term "tissue" had really been employed. At all events he felt sure he had not gone so far as to assert that a whole turbinal bone had been regenerated, but he had undoubtedly claimed that there had been an obvious reproduction of a potential turbinal body, which included mucous membrane glands and erectile tissue, and apparently some extra formation of bone. In this case he later removed some of the softer part of the regenerated body, and it was found by Dr. Pegler to consist, on microscopic examination, of the ordinary turbinal vascular tissue covered by mucous membrane. There might be pathological objections to the use of the term "regeneration" in this relation, but he had been unable to find another word which more appropriately represented the apparent sequence of events in this case. He was not, of course, prepared to loosely use the word regeneration in reference to every tumefaction recurring at the site of removal of obstructing structures in the nose. When, however, a patient was suffering from hyperplastic enlargements in the nose he thought that on removal of the obstructing structures (whether turbinal, or septal hyperplasia, or polypi), there was often subsequently evidenced an undoubted proclivity to recurrence quite apart from the temporary, though often prolonged tumefaction and excessive granulation immediately following and resulting from

operative interference. The cause of this tendency to reproduction or recurrence must be sought in the conditions leading to the original obstructive lesions which had not been counteracted, and which, in our present state of knowledge, were not always discoverable. Sinus disease was, of course, occasionally present as a causative, and therefore removable factor, but often the etiology was absolutely obscure.

In order to reduce excessive tumefaction and to prevent adhesions occurring immediately after operation, the speaker strongly recommended pressure by splints and bougies rather than by medicated gauze, as the latter often caused pain and bleeding on removal; on the whole there was nothing like rubber, and he generally, though not exclusively, used Lake's rubber splints. After Moure's operation (performed with Pegler's shears) he had found Asch's celluloid conical splint of great utility when inserted into the narrower nostril.

After keeping down tumefaction after the removal of the larger splints or bougies, *i. e.*, a day or two after major operation on the septum, he had found it of much advantage subsequent to syringing to dilate the inferior meatus with a laminaria tent for half an hour previous to the introduction of a rubber, soft tin, or celluloid splint. Tents should be made wedge-shaped with a sharp knife in order to facilitate their introduction. Thin splints only could be tolerated at first, *i. e.*, after removal of the large operative splint, but later they should give place to thicker ones. Such splints should be inserted for a time daily for several days and even weeks according to the nature of the case.

Adrenalin, Dr. Hill had been led practically to discard in after-treatment for quite another reason, however, than the debatable one of whether it caused secondary hemorrhage, for he had found it one of the worst irritants that he had ever applied to the nasal mucosa; and he felt strongly that its routine use in hyperæsthetic and inflammatory conditions was contra-indicated. For the same reason cauterization, whether electric or chemical, found no place in his after-treatment; nor, again, did strong antiseptic lotions; and as weak ones were useful only, or at all events principally on account of their mechanical action, he preferred to perform frequent lavage with water, previously boiled, and trust to that and to the germicidal action of the nasal mucosa. He did not wish to speak too dogmatically on this point, but, as a rule, in addition to lavage with sterilized water he only used antiseptic powders in cases where there was fœtor present before operation, and again when the ethmoidal cells had been opened. The discussion had been not only interesting but suggestive.

SELECTED ABSTRACTS.

The Physiology of the Middle Ear in its Relations to the Surgery of Otitis Media Sclerosa—G. NUVOLA—*Arch. Ital. di Otol.; Rinol.; Laryngol* Vol. xiii, fasc 2. July, 1902.

The author states that in dry otitis he desires to restore audition by a mobilization of the endotympanic organs by means of a perforation made in the membrane, if there exists an appreciable closure. In regard to the value of the other operation proposed for similar cases and which includes the removal of the membrane as also of the malleus and the incus, the author has turned his attention and sought to reply with experiments, to better define what sort of audition is obtained by such means and which is said to come *per vai ossea.*

I. The author placed the jar of a telephone (with the metal plates) in such a manner that the larger part is in the bottom; upon the plates he placed a watch above, a phonendoscope; with this latter could be heard the sound transmitted from the watch to the air and from that to the membrane.

II. To determine the nature and any physical property of the vibrations of the plates he made another experiment. He took a cube of box-wood, making in it an oval cavity at whose extremity he passed two wires at points six or seven millimeters distant from one another; he filled the cavity with charcoal (through the hole the author put a wax plug); he interposed the cube to one of the poles of an electric pile, but at the other pole he interposed a telephone. Placing under the cube a watch; the ticking could be perceived with the telephone; the electric current passing through the layer of charcoal found a greater or less resistance according to the greater or less compression of the charcoal; during the passage of a sonorous wave, in the condensing phase of the molecule of the cube the cavity contracts itself, the molecule of carbon finds itself in closer contact and the current passes more easily; the opposite occurs during the rarefying phase. In this manner the intensity of the current projected to the telephone is modified from the normal of the phase of a sonorous wave; thus the sonorous vibration produced in the cube from the contact of a watch is a *molecular* vibration.

III. He applies the cube to the first apparatus (between the plate and the microphone) to see if the vibrations are verified in the plate when he sees if upon advancing a sonorous body the sound is molecular or *in toto.* In experimenting with the watch, the phonendo-

scope takes up the sound, the telephone remaining silent; it must not be concluded that the cube does not vibrate in a molecular way; it sometimes happens that such vibrations are infinitestimal, such are capable of influencing the phonendoscope, but not the electric current through the fine cube to the point of causing the plate of the telephone to vibrate. Which demonstrates completely, for a watch whose tick or sound, when of greater intensity, is heard in the telephone—but the electric current which passes through the carbon can not me modified if the molecular connection of the cube and cavity are not in like mode; then it concerns a molecular movement from a vibrating plate if it is communicated to the cube

This sort of molecular sonorous vibration must be referred to those which are treated of in acoustics as *vibrations by influence;* such classic vibrations in many cases (of the two diapason) are produced more or less in all elastic bodies placed in proximity to any sound of sufficient intensity. The greater portion of elastic bodies are susceptible of being attuned *in a special manner to any determined sound* (like a diapason, a harmonic string, etc.) and is attuned in the most limited manner to an undetermined series of sounds.

This molecular sonorous vibration has the smallest place in the labyrinthine bony capsule and excites the acoustic nerve in which audition is not physiologic, it having an entrance solely by the bony way, when the tympanic apparatus (membrane and chain) is destroyed; this the author has named *audition by influence.*

To demonstrate that all elastic bodies, of whatever form and substance, vibrate through influence, the author substituted for metallic plates in experiment III, the most varied bodies (marble table, bottle, etc.) with the identical results differing only in intensity.

In proportion to the condensing and rarefying of sonorous waves are connected the most rapid and alternating variations of the capacity of the labyrinthine cavity and in consequence in the compression and expansion of the perilymph which suggests a coming and going, of which the long time is of little importance and that it goes to the vestibule, it forces the cochlear obstruction; penetrates the fenestra rotunda and vice versa. Since it is supported in a spontaneous search, the organ of Corti may become excited. Physiologic audition in addition to these results is joined by this, spontaneously, from the movement of the stapes.

Now, speaking of auricular surgery relative to dry otitis, the author admits that *exenteration of the tympanic cavity* should bring about an improvement, and as a matter of fact, practice proves it; but in regard to the mobility of the stapes he believes that it is not necessary. In fact the vibration by influence will equally occur when the

stapes is entirely removed from the fenestra ovale, which can be experimentally proven by splitting a plate, held by a weight between the phonendoscope and the cube, the whole being arranged as in experiment III. Thus, in this manner the phonendoscope and the telephone reveal the sonorous vibration as though the plate were free and mobile.

Audition by influence is really a muscular acoustic phenomenon, but does not show the mobility of the stapes and it is independent of its mobility. And, on the other hand, the stapes, by the marvelous construction of the auricle and of the membrane of a sound ear, is capable of receiving any sonorous movement that is possible, when the membrane and chain of ossicles are destroyed. The smallest of sonorous vibrations act upon the stapedial region (being the stapes included within the walls of the vestibule from the side and posterior border of the tympanic ring to the other) the plate not being oblique or even perpendicular.

Of what small or imperceptible utility can the motility of the stapes be, when the sonorous wave is not perceived to reach it?

Such facts would seem to be clinical proofs of the assertion of Gradenigo who says that the best which is obtained in otitis media sclerosis with exenteration of the tympanic cavity *is not greater* in general with mobilization, than with the extraction of the stapes.

But there are cases in which the mobility of the stapes *is useful,* and this occurs when by a fortunate anatomical anomaly, it presents itself in a good part, or it is completely changed and has its plate not inclined but well in front and perpendicular to the axis of the auditory canal.

There are seen cases in which the mobility of the stapes *impairs* audition: this is the case when the sonorous waves have an energy inferior to the resistance offered by the stapes and labyrinthine liquid; in which case audition occurs through influence and in such a case when the stapes is rigid, the dislodging of the perilymphatic liquid is attended with little energy against the cochlear obstruction, the excitation and reaction of the organ of Corti being correspondingly greater.

It remains to state a few things on the surgery of the fenestra rotunda.

Its physiologic function is to be curved toward the tympanic cavity, being the incompressible labyrinthine liquid, which act on the stapes pushes it towards the labyrinthine cavity and *vice versa.* Such a great importance is indispensable to audition by influence. When success shall be attained, by means of surgical procedures, to destroy the function which is proper to the fenestra rotunda, obliterated by pathologic processes, these operative maneuvers will be exenteration of the tympanic cavity producing a condition very favorable for audition by influence, the only audition possible when the lesions of otitis media sclerosa have destroyed physiologic audition.

G. Ferreri.

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The Removal of Foreign Metallic Bodies from the Air Passages by the Electro-Magnet. By Dr. Georges Varenne, of Bordeaux. A monograph of 54 pages; published by G. Delmas, Bordeaux, France.

In this interesting monograph the author considers the question of removal of metallic foreign bodies from the air passages, presenting numerous experiments on the cadaver, reporting a series of successful clinical cases, and describing several forms of electro-magnets employed for the purpose.

The author claims that many cases of foreign bodies lodged in the respiratory tract can be removed by the electro-magnet, and without surgical intervention. Several cases are reported where the foreign body has been drawn up and out of the trachea by the magnetmoving in parallel lines to the tracheal wall. Another form of magnet is described with a curve like that of an laryngeal applicator, by means of which the end of the magnet can be introduced beyond the vocal cords to engage small bodies like pins and nails in the tracheal folds. The X-Ray and radiographs are employed to determine the character, size and position of the foreign body.

M. A. G.

Die Krankheiten des Rachens. By Prof. Dr. Ottokar Chiari, of the Royal University or Vienna. Octavo, pp. 250, illustrations 118, and one chromo lithographic plate. Publisher, Franz Deuticke, Vienna and Leipzig, 1903. Price, 7 marks.

This volume is Part Two of the author's series of "Die Krankheiten der Oberen Luftwege," presenting the diseases of the Pharynx in eleven chapters.

In chapters one and two the anatomy and physiology of the pharynx are discussed; chapter three considers general pathology, and contains practical paragraphs on disturbances of resonance, articulation, deglutition, paralysis and various nervous phenomena affecting the pharyngeal areas; also anomalies of secretion, vaso-motor and sensory disturbances. Chapter four presents a practical description of methods of examining the pharynx and fauces and a special paragraph on the digital examination of the naso-pharynx. General therapeutic measures are described in chapter five, and the various forms of local treatment are here outlined. Chapter six discusses catarrhal diseases, chapters seven and eight infectious diseases, chapter nine stenosis and anomalies, chapter ten injuries and foreign bodies, and chapter eleven neoplasms of the pharynx.

The plan and sub-division of this work on the Pharynx is similar in character to that adopted by the author in his work on "Diseases of the Nose." Twenty-eight of the illustrations are reproductions of the water-color drawings of Dr. Elfinger, of the Türck clinic. This volume appears to be a more exhaustive treatise of the subject at hand than was Part One of the author's series.

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